226

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SUPPLEMENTAL DATA TO PHOTOFACT FOLDER 5 IN SET 213

MODEL No.	CODE	RF CH.	DEFL. CH.	RADIO CH.	UHF TUNER
A-T2292	128	94A	J-5	RT-10	
A-T2292L	128	94	J-5	RT-10	
A-T2294	128	94	J-5	RT-11	
A-UT2292L	128	94A	J-5	RT-10	UT-20A
53-T2285, L, S	128	94	J-5	RT-8	
53-T2287	128	94	J-5	RT-11	
53-U2285	126	94	J-4	RT-8	UT-20
53-U2286	126	94	J-4	RT-10	UT-20

The above Philco television receivers are similar to the Models covered in Photofact Folder 5 in Set 213 with the following exceptions.

MODELS 53-U2285, 53-U2286 (Code 126)

Models 53-U2285 and 53-U2286 (Code 126) are identical to Models 53-T2285 and 53-T2286, respectively, except a built-in UHF tuner (Model UT-20) is included. A schematic of the tuner is included in this bulletin.

MODELS A-T2292, L, 53-T2285, L, S (Code 128)

Models A-T2292, L, A-T2294, 53-T2285, L, S and 53-T2287 (Code 128) are identical to the Models covered except the J-5 deflection chassis is used. This chassis is similar to the J-4 chassis except, for changes in the vertical and horizontal output circuits which are given below.

MODEL A-UT2292L (Code 128)

Model A-UT2292L (Code 128) incorporates both the UHF tuner and the J-5 deflection chassis.

Chassis J-5

VERTICAL OUTPUT CIRCUIT CHANGED

The vertical output tube, V16, was changed from a type 12BH7 to a 12B4 tube. When the 12B4 tube is used the following changes were made in the associated components.

1. C98, peaking capacitor, was changed from .068MFD to .047MFD.
2. R105, peaking resistor, was changed from 5.6KΩ to 6.8KΩ.
3. C100, coupling capacitor, was changed from .1MFD to .22MFD.
4. R106, grid resistor, was changed from 1Meg to 2.2Meg.
5. R108, cathode resistor, was changed from 47Ω to 470Ω and a 100MFD capacitor was added across it.
6. R109, R110 and C102 are omitted when the 12B4 tube is used.
7. The vertical output transformer was changed to part #32-8539-1.

A partial schematic, showing the new circuit is given on the reverse side.

PHILCO MODELS A-T2292, L, A-T2294, A-UT2292L, 53-T2285, L, S, 53-T2287 (Code 128) (Ch. 94, A, J-5), 53-U2285, 53-U2286 (Code 126) (Ch. 94, J-4)

PRODUCTION CHANGES
BULLETIN 85

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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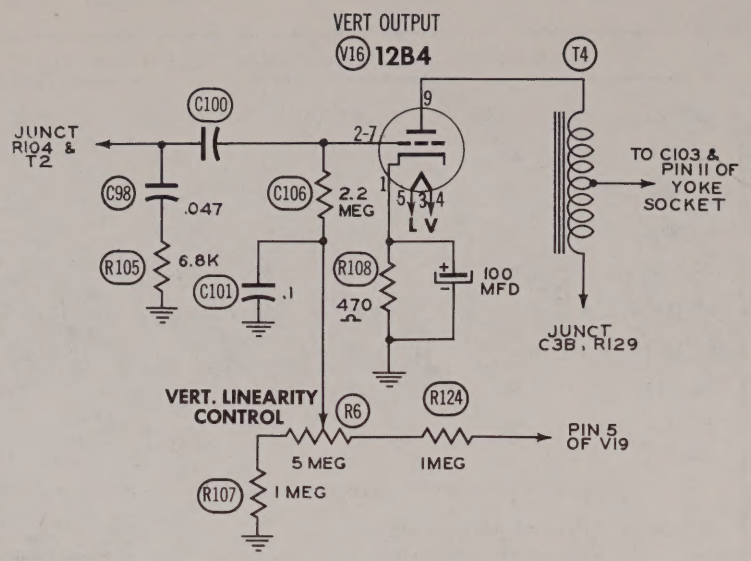

HORIZONTAL OUTPUT CIRCUIT REVISED

A 68KΩ resistor was added, in series with the lead from terminal 9 of the chassis interconnecting socket, to the width control, R7.

A .01MFD capacitor was added from terminal 9 of the chassis interconnecting socket to ground.

R128 was changed from 8.2KΩ to 47KΩ.

R129 was changed from 33KΩ to 8.2KΩ.

C3B was changed from 40MFD to 10MFD.

COMPONENT CHANGES

R132, high voltage rectifier filament dropping resistor, was changed from 2.7Ω to 4.7Ω.

R102, in series with the vertical hold control. was changed from 220KΩ to 180KΩ.

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PHILCO MODELS A-T2292, L, A-T2294, A-UT2292L, 53-T2285, L, S, 53-T2287
(Code 128) (Ch. 94, A, J-5), 53-U2285, 53-U2286 (Code 128) (Ch. 94, J-4)

PHILCO UHF TUNER MODEL UT20, UT20A

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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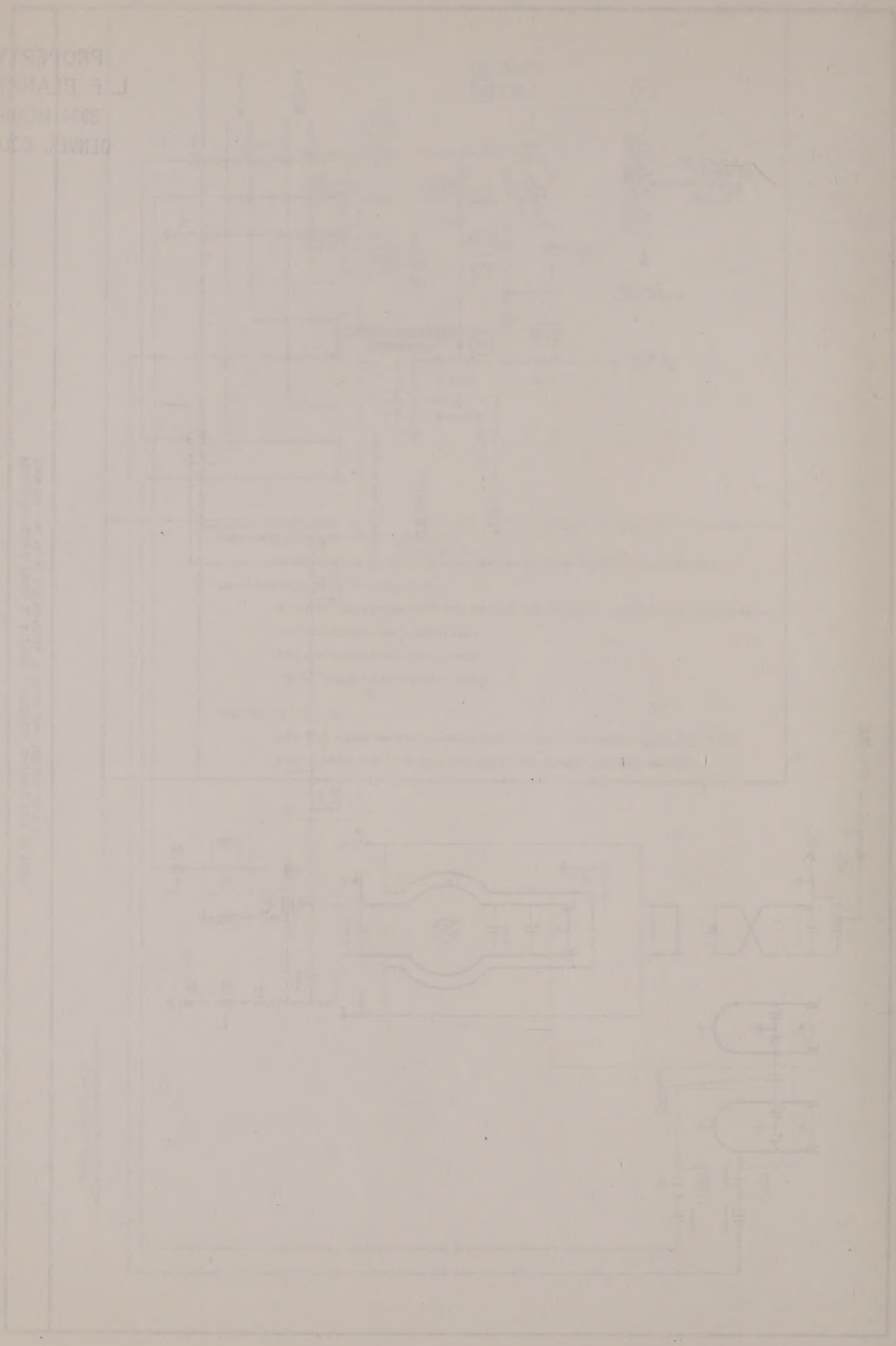

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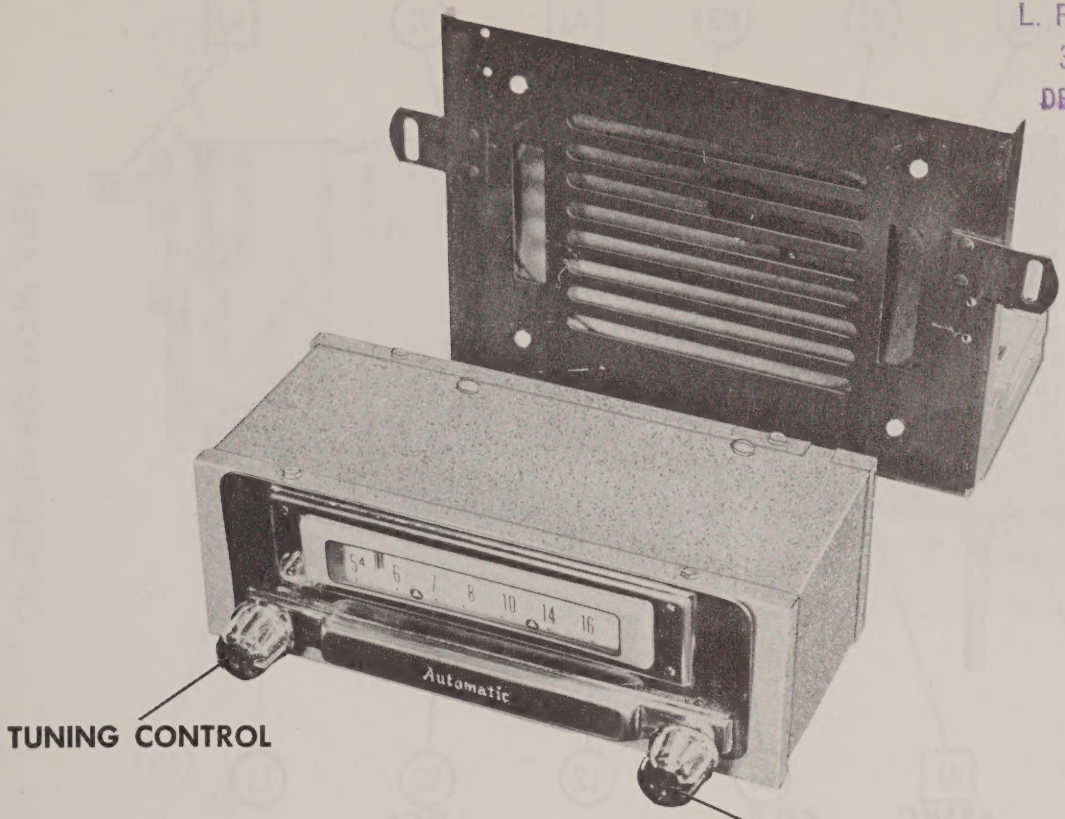

AUTOMATIC
MODEL PM-236

TRADE NAME	Automatic Model PM-236 (For 1953 Plymouth Automobiles)
MANUFACTURER	Automatic Radio Mfg. Co., Inc., 122 Brookline Ave., Boston, Mass.
TYPE SET	Battery Operated AM Superheterodyne Receiver
TUBES	Types 6BA6 RF Amp., 6BE6 Conv., 6BA6 IF Amp., 6AT6 or 6AV6 Det.-AVC-AF Amp., 6V6GT Audio Output, 6X4 Rectifier
POWER SUPPLY	6 Volt Storage Battery RATING 5.9 Amp. @ 6.3 Volts DC
TUNING RANGE—BROADCAST	538-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 7 (grid) of 6BE6 (V2). Low side to chassis.	455KC (400~Mod)	High frequency end stop	Across voice coil	A1, A2, A3, A4	Adjust for maximum deflection.
2.	68MMF	High side to antenna receptacle. Low side to chassis.	1610KC	"	"	A5	"
3.	"	"	1400KC	Tune to 1400KC signal	"	A6, A7	"
4.	With radio installed in car and antenna fully extended tune to a weak station near 1400KC and adjust A7 for maximum volume.						
	Tune to low frequency end stop and set pointer to last low frequency index mark on the dial.						

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: AUTOMATIC PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RTMA BASE TYPE	NOTES
V1	RF Amplifier	6BA6	6BA6	7BK	
V2	Converter	6BE6	6BE6	7CH	
V3	IF Amplifier	6BA6	6BA6	7BK	
V4A	Det.-AVC-AF Amp.	6AT6	6AT6	7BT	
B	Det.-AVC-AF Amp.	6AV6	6AV6	7BT	
V5	Audio Output	6V6GT	6V6GT	7S	
V6	Rectifier	6X4	6X4	5BS	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: AUTOMATIC PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	■20	350	CE-86	AFH3-109		CO80		FP345.8	TVL-3678	
B	▲20	350								
C	20	25								
C2	.05	200	C-503-2	P288-05	DF-503	PTE4S5		PT415	2TM-S5	
C3	100		CC-101	SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C4	.006	400	C-602-4	P688-005	D6-502	PTE6D5	GP2-333-602	PT626	6TM-D6	
C5	.05	200	C-503-2	P288-05	DF-503	PTE4S5	GP1K-050	PT415	2TM-S5	
C6	5		CC-50	SI5				ZT-555	5GA-V5	
C7	40		CC-400	SI40	D6-400					
C8A	220									
B	5000									
C	250 *		*PC-151	*PA-113-2	*PC151		*1408-02		*103C5	
D	5000									
E	250*									
C9	.01	600	C-103-6	P688-01	DD-1032	PTE6S1	GP2-333-103	PT611	6TM-S1	
C10	.005	200	C-502-2	P688-005	D6-502	PTE6D5	GP2-333-502	PT625	6TM-D5	
C11	.47	100	C-504-1	VHC-36		MP2P5		RF480	2TM-P5	
C12	.008	1600	C-802-16	VBC-26		PTE1608		PT1628	MB-D8	
C13	.47	100	C-504-1	UHC-36		MP2P5		RF480	2TM-P5	

* Items C8A, C8B, C8C, C8D, C8E, R9A, R9B, R9C are combined in one unit.
When replacing items separately items C8C and C8E should total 250MMF.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: AUTOMATIC PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	750KΩ	½	RV-57	Q13-137	AG-79-Z	B-70-S	U-51	Volume-See Note
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A

Note: Some Models may use an alternate control (part #RV-132)

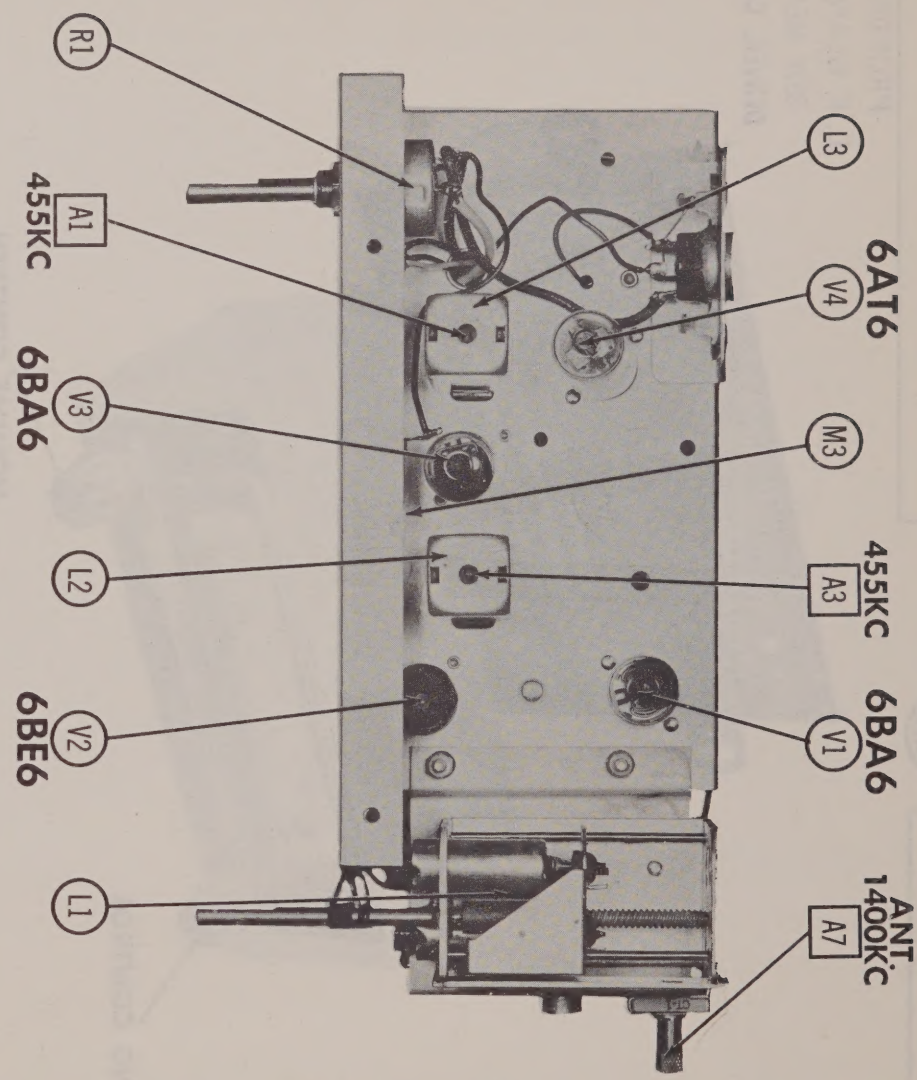
RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AUTOMATIC PART No.	IRC PART No.	NOTES
R2	470KΩ	½	R474	BTS-470K	
R3	150Ω	½	R151	BTS-150	Note 1
R4	150KΩ	½	R154	BTS-150K	
R5	47KΩ	½	R473	BTS-47K	
R6	1500Ω	½	R152	BTS-1500	Note 2
R7	6800Ω	2	R682-2	BTB-6800	
R8	2.2Meg	½	R225	BTS-2.2Meg	Note 3

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: AUTOMATIC PART No.	IRC PART No.	NOTES
R9A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	*PC-151	BTS-470K	
C	470KΩ	½		BTS-470K	
R10	470KΩ	½	R474	BTS-470K	
R11	330Ω	½	R331	BTS-330	
R12	1000Ω	1	R102-1	BTA-1000	
R13	100Ω	½	R101	BTS-100	
R14	100Ω	½	R101	BTS-100	

Note 1. Some Models may use a 220Ω resistor in this application.
Note 2. Some Models may use a 1000Ω resistor in this application.
Note 3. Some Models may use a 2Meg resistor in this application.
* Items R9A, R9B, R9C, C8A, C8B, C8C, C8D, C8E are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (VIBRATOR)

ITEM No.	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	AUTOMATIC PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
T1	6.3VAC @2A	430VCT .046ADC			TV-100		P-2971	VT-1 ①	V-16K

① Drill new mounting holes.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		AUTOMATIC PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T2	5KΩ	3.2Ω	370Ω	.54Ω	Part of Spkr.	A-3877	A-2930	RO-9 ①	S-3X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	AUTOMATIC PART No.	JENSEN PART No.	QUAM PART No.	
SP1	6 x 9"	PM	3.2Ω	PM-900	ST-810 Mod. P69-V	69A3	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	AUTOMATIC PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1A	Ant. Coil	13Ω						Part of tuner assy. (tuner part #PT-500)
B	RF Coil	13Ω						Part of tuner assy. (tuner part #PT-500)
C	Osc. Coil	.5Ω	2.6Ω					Part of tuner assy. (tuner part #PT-500)
L2	Input IF	18Ω	18Ω	1655-16	16-6758	BC-352	12-C1	
L3	Output IF	18Ω	18Ω	1655-16	16-6758	BC-353	12-C2	
L4	Fil. Choke	0Ω		L203			5221	1.5 Microhenries
L5	Vibrator Hash Choke	0Ω		L202			5221	4 Microhenries

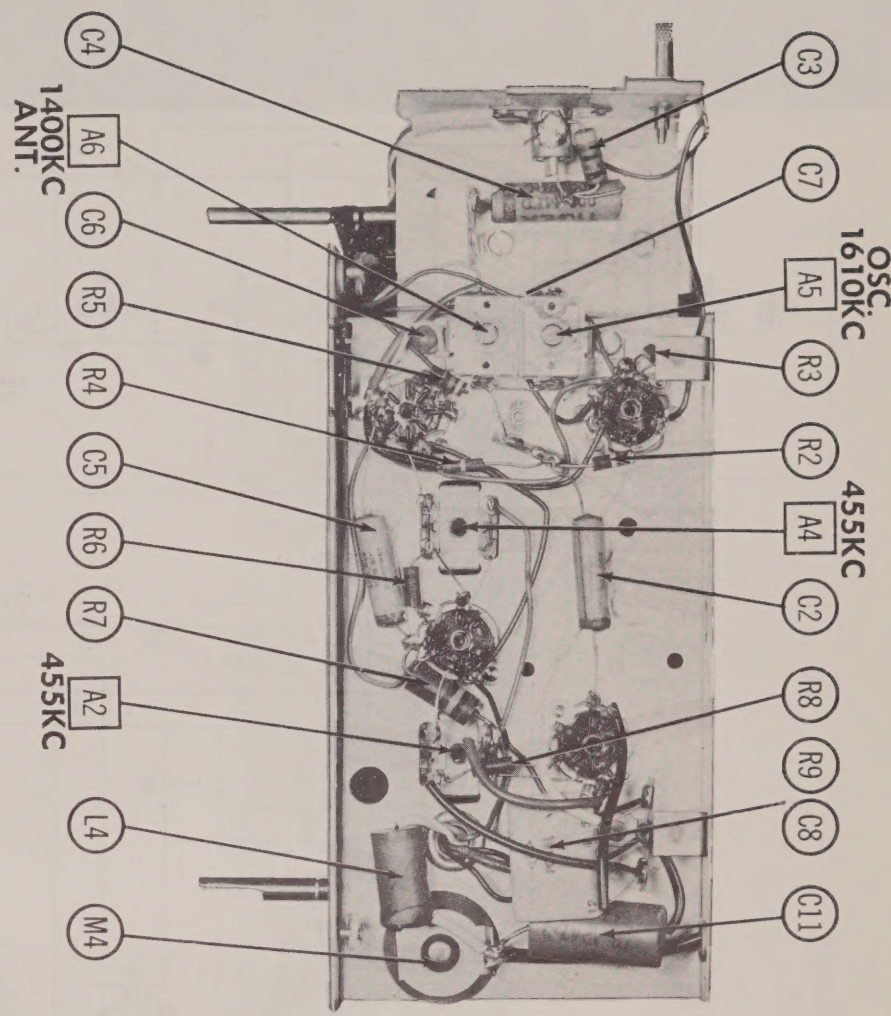
VIBRATOR

ITEM No.	TYPE	INPUT VOLTS	FREQUENCY	REPLACEMENT DATA				NOTES
				AUTOMATIC PART No.	CORNELL-DUBILIER PART No.	MALLORY PART No.	RADIART PART No.	
M1	Interrupter	6.3V	115v	V-83	5301	859	5301	

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			AUTOMATIC PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M2	3AG	14A	A200	FH226 (Includes lead assy.)	307014 (14A-SFE)	155014	SFE14	HD1

CHASSIS—BOTTOM VIEW

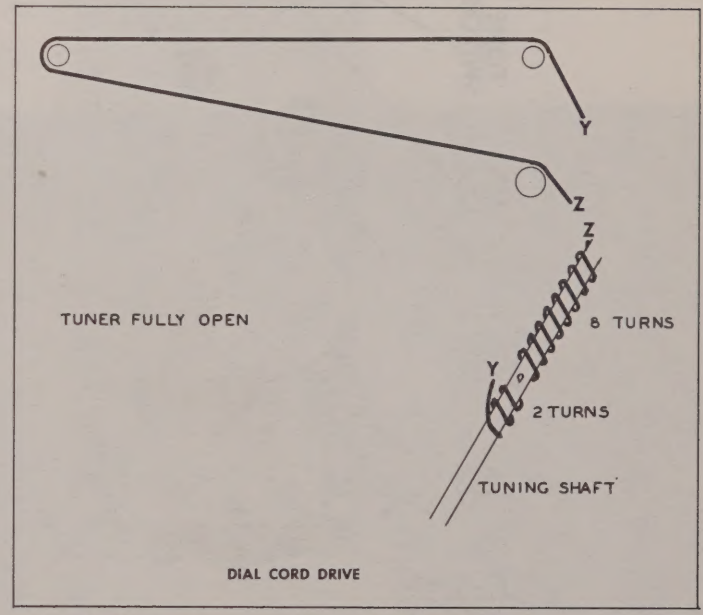


PARTS LIST AND DESCRIPTIONS (Continued)

MISCELLANEOUS

ITEM No.	PART NAME	AUTOMATIC PART No.	NOTES
M3	Dial Light	T47	Type #47
M4	Spark Plate		
M5	Switch	SS-1	Bass-Treble Slide Switch
A5	Trimmer Cap.	CT-3	Osc. Trimmer
A6	Trimmer Cap.	CT-2	RF Trimmer
A7	Trimmer Cap.	CT-1	Antenna Compensator
	"A" Lead Assy.	FH226	Includes fuse holder
	Knob	H310E	Off/On/Volume-Tuning (2 used)
	Dial Scale	DP150	

CHASSIS—BOTTOM VIEW



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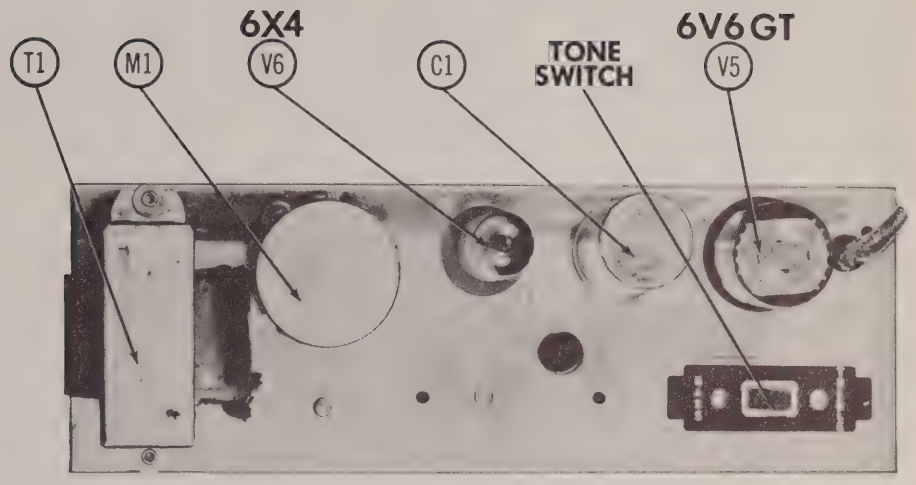

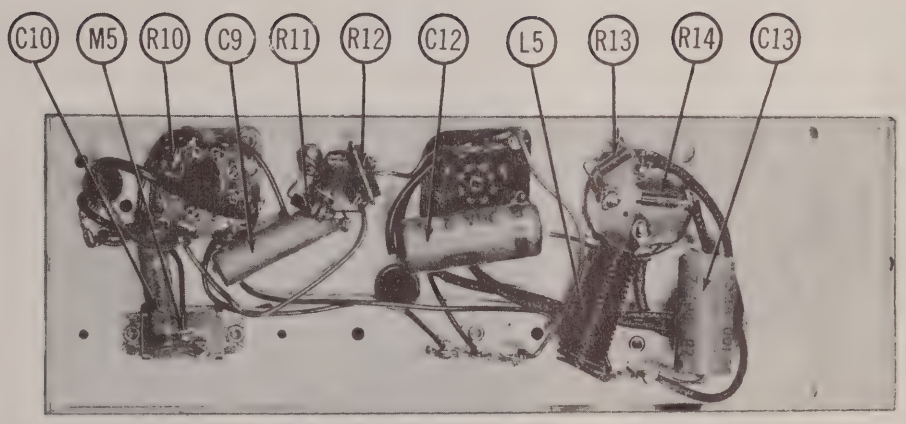

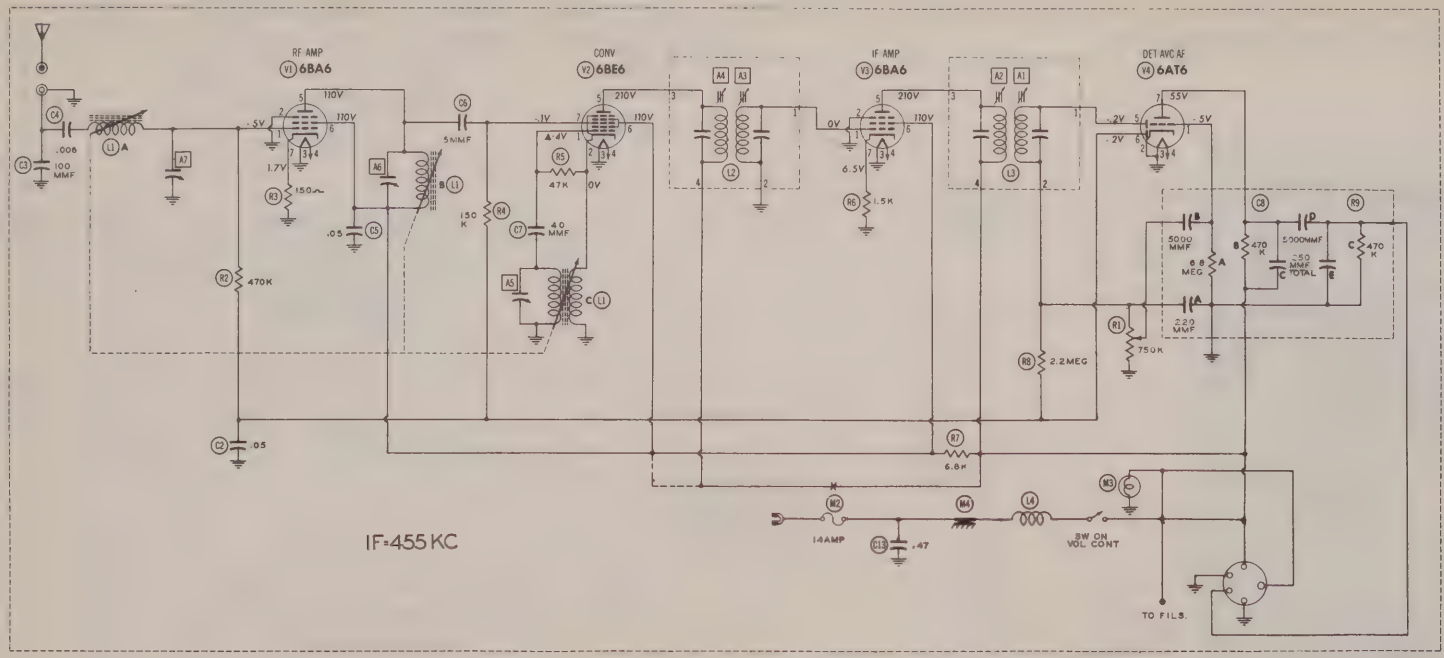

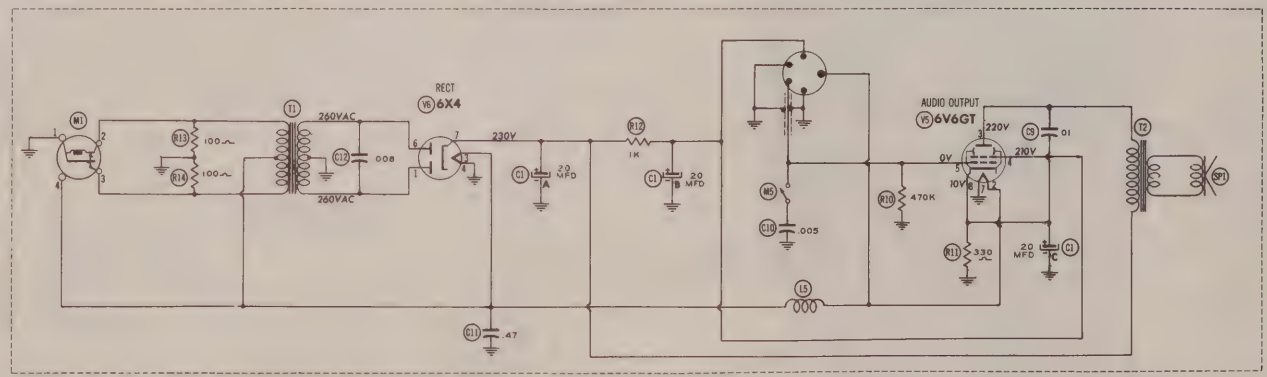

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	6BA6	3.5Meg	0Ω	0Ω	4Ω	*6.8KΩ	*6.8K	150Ω	
V 2	6BE6	47KΩ	.5Ω	0Ω	.4Ω	*1KΩ	*6.8KΩ	2.8Meg	
V 3	6BA6	17Ω	0Ω	0Ω	.4Ω	*1KΩ	*6.8KΩ	1.5KΩ	
V 4	6AT6	470KΩ	0Ω	0Ω	.6Ω	750KΩ	2.8Meg	*470KΩ	
V 5	6V6	INF	.4Ω	*370Ω	*1KΩ	470KΩ	INF	0Ω	330Ω
V 6	6X4	330Ω	INF	.5Ω	0Ω	INF	400Ω	3Meg	

*MEASURED FROM PIN 7 OF V6
▲TAKEN WITH VACUUM TUBE VOLTMETER

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1 - DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Battery voltage maintained at 6.3 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
6 - Volume control at maximum, no signal applied for voltage measurements.

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The contents for this envelope will be found among the last folders in this complete set of folders . . . *unless* it has been purchased as part of a *complete* volume of PHOTOFACTS assembled in a DeLuxe Binder.

Merely insert the corresponding folder on this model in this envelope to retain proper filing and indexing order.

CHASSIS 317-D

JACKSON
CHASSIS 317-B, -D, 321-B, -D

DENVER, COLORADO

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JACKSON
CHASSIS 317-B, -D, 321-B, -D

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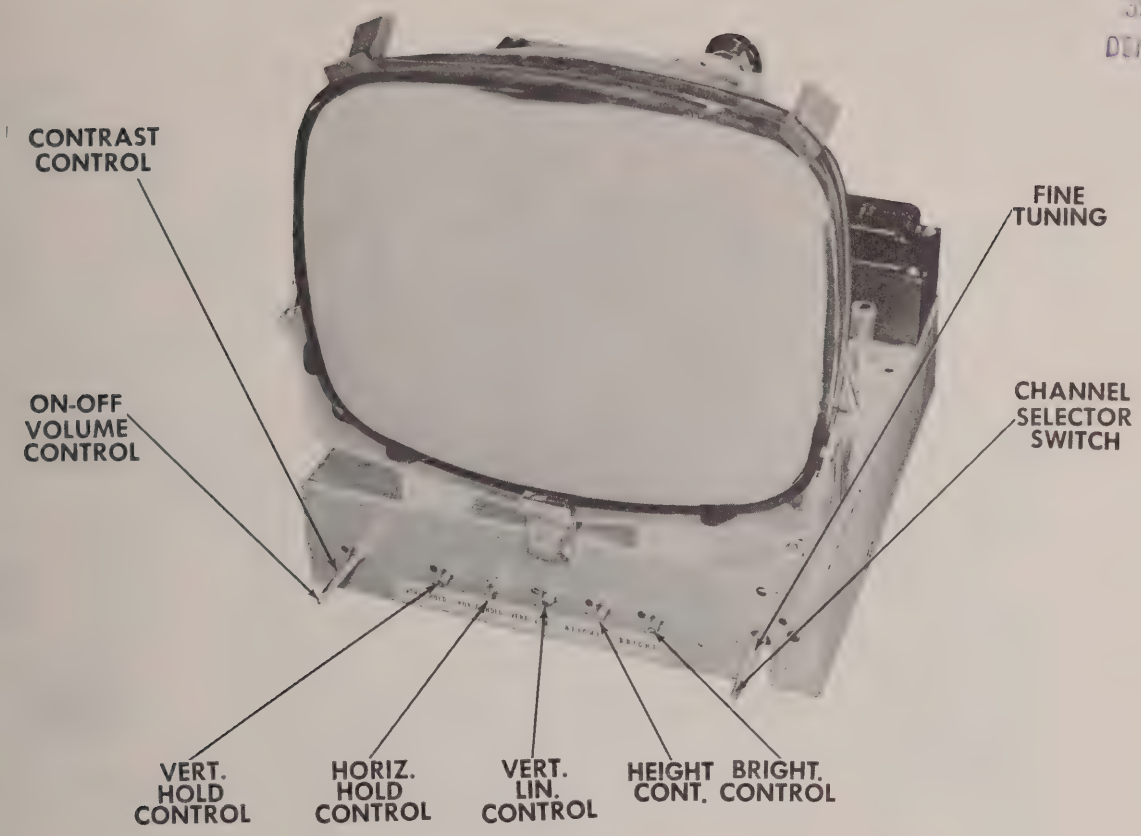

JACKSON CHASSIS 317-D

TRADE NAME	Jackson Chassis 317-B, 317-D, 321-B, 321-D
MANUFACTURER	Jackson Ind., Inc., 500 E. 40th St., Chicago, Ill.
TYPE SET	Television Receiver
TUBES	Twenty
POWER SUPPLY	110-120 Volts AC-60 cycle RATING 1.76 Amp. @ 117 Volts AC
TUNING RANGE—	Channels 2 thru 13, Video IF 25.75MC, Sound IF 21.25 MC (Intercarrier)

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Tube Placement Chart (Top View) 5

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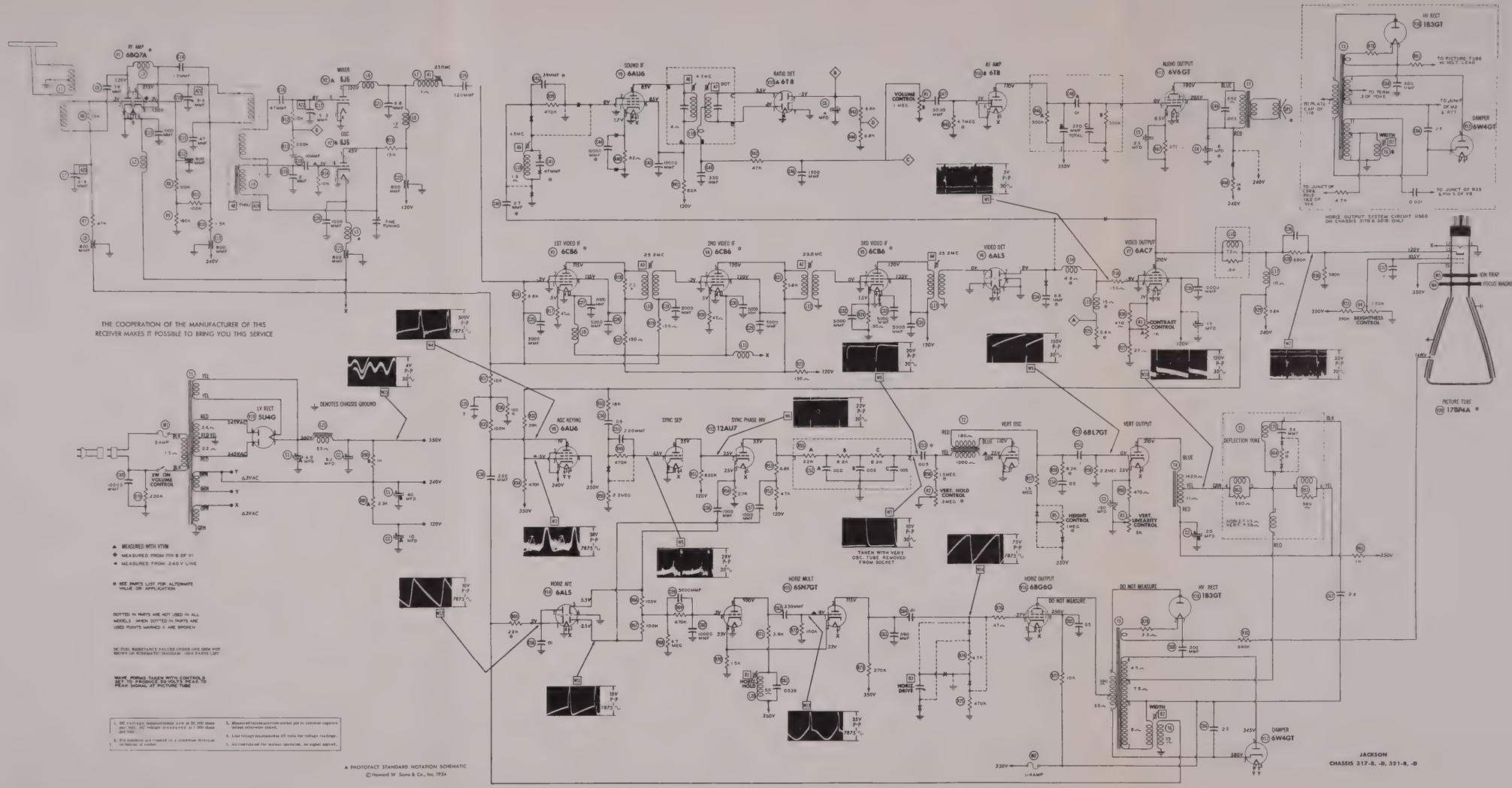
JACKSON
CHASSIS 317-B, -D, 321-B, -D


THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE
RF AMP V1 6BQ7A
MIXER V2A 6J6
OSC V2B 6J6
SOUND IF V9 6AU6
RATIO DET V10A 6T8
AF AMP V10B 6T8
AUDIO OUTPUT V11 6V6GT
HV RECT V18 1B3GT
1ST VIDEO IF V3 6CB6
2ND VIDEO IF V4 6CB6
3RD VIDEO IF V6 6CB6
VIDEO DET V5 6AL5
VIDEO OUTPUT V7 6AC7
AGC KEYING V8 6AU6
SYNC SEP
SYNC PHASE INV V12 12AU7
VERT OSC
VERT OUTPUT V13 6BL7GT
HORIZ AFC V14 6AL5
HORIZ MULT V15 6SN7GT
HORIZ OUTPUT V16 6BG6G
LV RECT V19 5U4G
HV RECT V18 1B3GT
DAMPER V17 6W4GT
PICTURE TUBE V20 17BP4A
DENOTES CHASSIS GROUND
SW ON VOLUME CONTROL
CONTRAST CONTROL
BRIGHTNESS CONTROL
HEIGHT CONTROL
VERT. LINEARITY CONTROL
VERT. HOLD CONTROL
HORIZ HOLD
HORIZ DRIVE
WIDTH
ION TRAP
FOCUS MAGNET
DEFLECTION YOKE
TUNING
FINE TUNING
TAKEN WITH VERT OSC. TUBE REMOVED FROM SOCKET
DO NOT MEASURE
HORIZ OUTPUT SYSTEM CIRCUIT USED ON CHASSIS 317B & 321B ONLY
▲ MEASURED WITH VTVM
◆ MEASURED FROM PIN 8 OF V1
● MEASURED FROM 240 V. LINE
SEE PARTS LIST FOR ALTERNATE VALUE OR APPLICATION
DOTTED IN PARTS ARE NOT USED IN ALL MODELS. WHEN DOTTED IN PARTS ARE USED POINTS MARKED X ARE BROKEN
DC COIL RESISTANCE VALUES UNDER ONE OHM NOT SHOWN ON SCHEMATIC DIAGRAM - SEE PARTS LIST
WAVE FORMS TAKEN WITH CONTROLS SET TO PRODUCE 50 VOLTS PEAK TO PEAK SIGNAL AT PICTURE TUBE
1. DC voltage measurements are at 20,000 ohms per volt. AC voltage measured at 1,000 ohms per volt.
2. Pin numbers are counted in a clockwise direction on bottom of socket.
3. Measured values are from socket pin to common negative unless otherwise stated.
4. Line voltage maintained at 117 volts for voltage readings.
5. All controls set for normal operation, no signal applied.
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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JACKSON
CHASSIS 317-B, -D, 321-B, -D

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JACKSON
CHASSIS 317-B, -D, 321-B, -D
CHASSIS TOP VIEW

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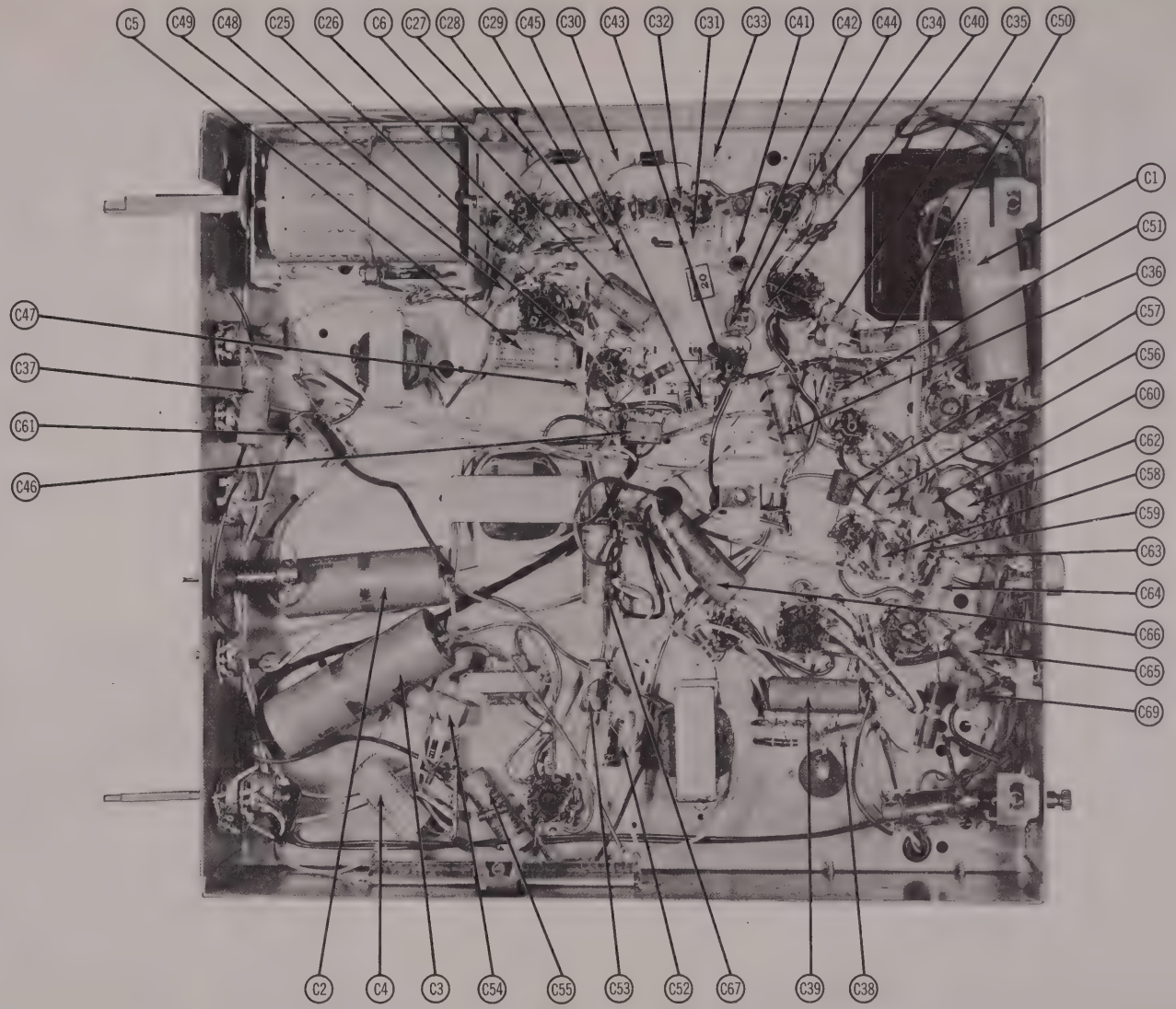

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

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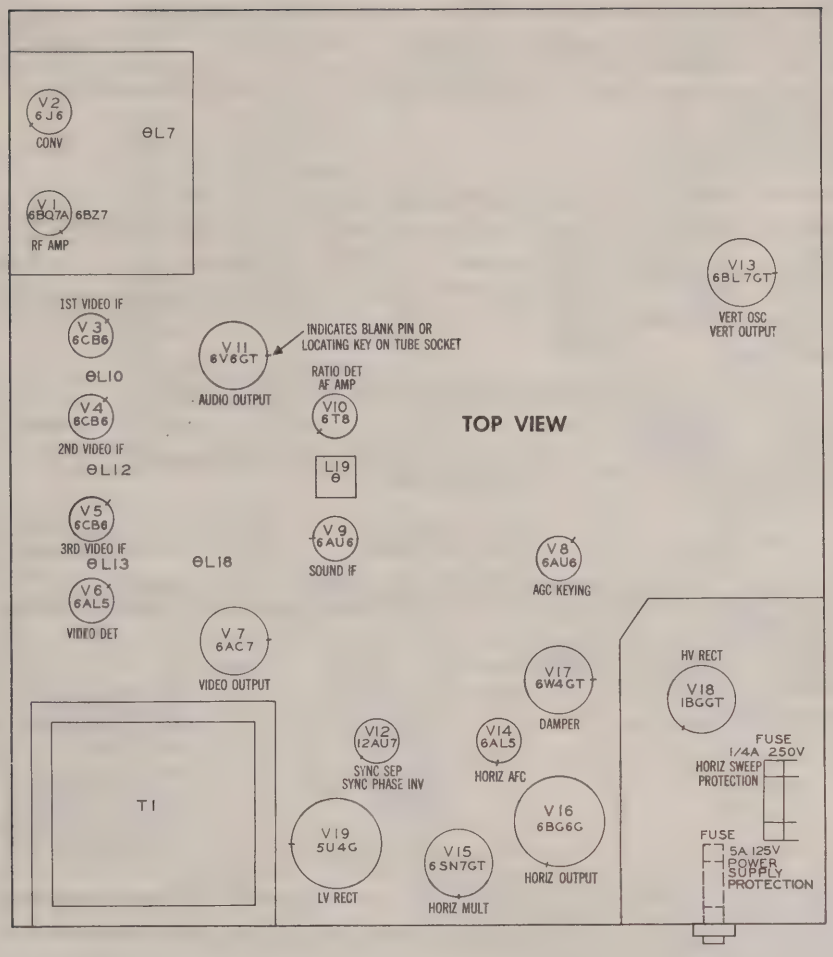

JACKSON
CHASSIS 317-B, -D, 321-B, -D

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V19, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6, V7
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V20
Has pic, no sound - V9, V10, V11
Overloaded picture - V8

SYNC FAILURE
No vert. sync - V12, V13
No horiz. sync - V12, V14, V15
No vert. or horiz. sync - V12

SWEEP FAILURE
No raster, has sound - V15, V16, V17, V18, V20, Fuse (M2)
No vertical deflection - V13
Poor vert. linearity or foldover - V13
Poor horiz. linearity or foldover - V15, V16, V17
Narrow picture - V15, V16, V17, V18, V19
Vert. off freq. - V12, V13
Horiz. off freq. - V12, V14, V15

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis.

VIDEO IF ALIGNMENT

Remove the converter tube (V2) from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 1.5 volt battery to the ungrounded side of C29. Connect the positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	23.0MC (Unmod)	Any	DC probe to point ◇A◇. Common to chassis.	A1, A2	Adjust for maximum deflection.
2.	"	"	25.2MC	"	"	A3, A4	"

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
3.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.25MC 22.0MC 24.3MC 25.75MC	Any	Vert. Amp. to point ◇A◇. Low side to chassis.		Check for response curve similar to Fig. 1. If necessary retouch A1 thru A4 for desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
4.	.001MFD	High side to pin 4 (grid) of 6AC7 (V7). Lowside to chassis.	4.5MC Unmod	Any	DC probe to point ◇B◇. Common to chassis.	A5, A6	Adjust for maximum deflection.
5.	"	"	"	"	DC probe to point ◇C◇. Common to point ◇D◇.	A7	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.
Set the contrast control to maximum.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
4.	.001MFD	High side to Pin 4 (grid) of 6AC7 (V7). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. amp to point ◇B◇. Low side to chassis.	A5, A6	Disconnect stabilizer capacitor C6. Adjust for curve of maximum amplitude and symmetry as in Fig. 2.
5.	"	"	"	"	"	Vert. amp to point ◇C◇. Low side to chassis.	A7	Reconnect stabilizer capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. Slightly retouch A6 for maximum amplitude and straightness of crossover lines.

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
The channel adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.
Leave 1.5 bias battery connected as under Video IF Alignment.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. to point ◇A◇. Low side to chassis.	A8	Adjust to place video marker at 50% on response curve as in Fig. 4. Sound marker should be at 5% or less.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A9	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A10	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A11	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A12	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A13	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A14	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A15	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A16	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A17	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A18	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A19	

ALIGNMENT INSTRUCTIONS (cont)

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DENVER, COLORADO

RF AND MIXER ALIGNMENT

Remove the 1.5 volt bias battery.
Connect the synchronized sweep voltage form the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205. 25MC 209. 75MC	12	Vert amp. thru 10KΩ to point (E). Low side to chassis.	A20, A21 A22	Adjust for response curve similar to Fig. 5, with markers as shown.
8.	"	"	213MC (10MC Swp)	211. 25MC 215. 75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel make compromise adjustments of A20, A21, and A22 with channel switch set to that channel, then check all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199. 25MC 203. 75MC	11			
			195MC (10MC Swp)	193. 25MC 197. 75MC	10			
			189MC (10MC Swp)	187. 25MC 191. 75MC	9			
			183MC (10MC Swp)	181. 25MC 185. 75MC	8			
			177MC (10MC Swp)	175. 25MC 179. 75MC	7			
			85MC (10MC Swp)	83. 25MC 87. 75MC	6			
			79MC (10MC Swp)	77. 25MC 81. 75MC	5			
			69MC (10MC Swp)	67. 25MC 71. 75MC	4			
			63MC (10 MC Swp)	61. 25MC 65. 75MC	3			
			57MC (10MC Swp)	55. 25MC 59. 75MC	2			

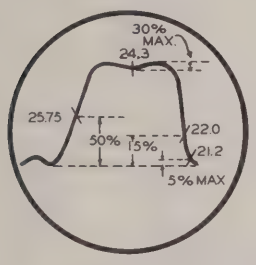


FIG. 1

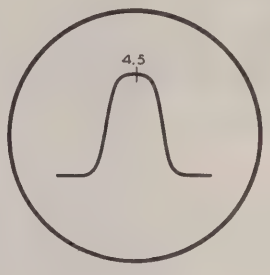


FIG. 2

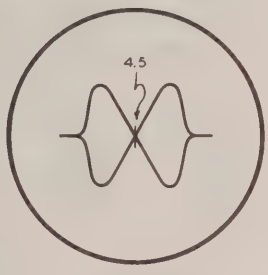


FIG. 3

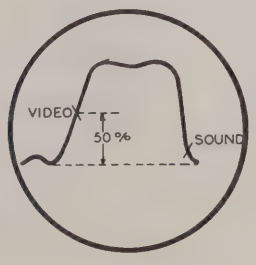


FIG. 4

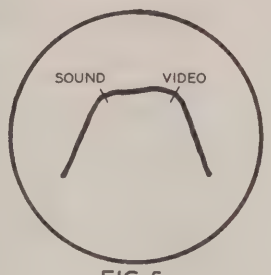
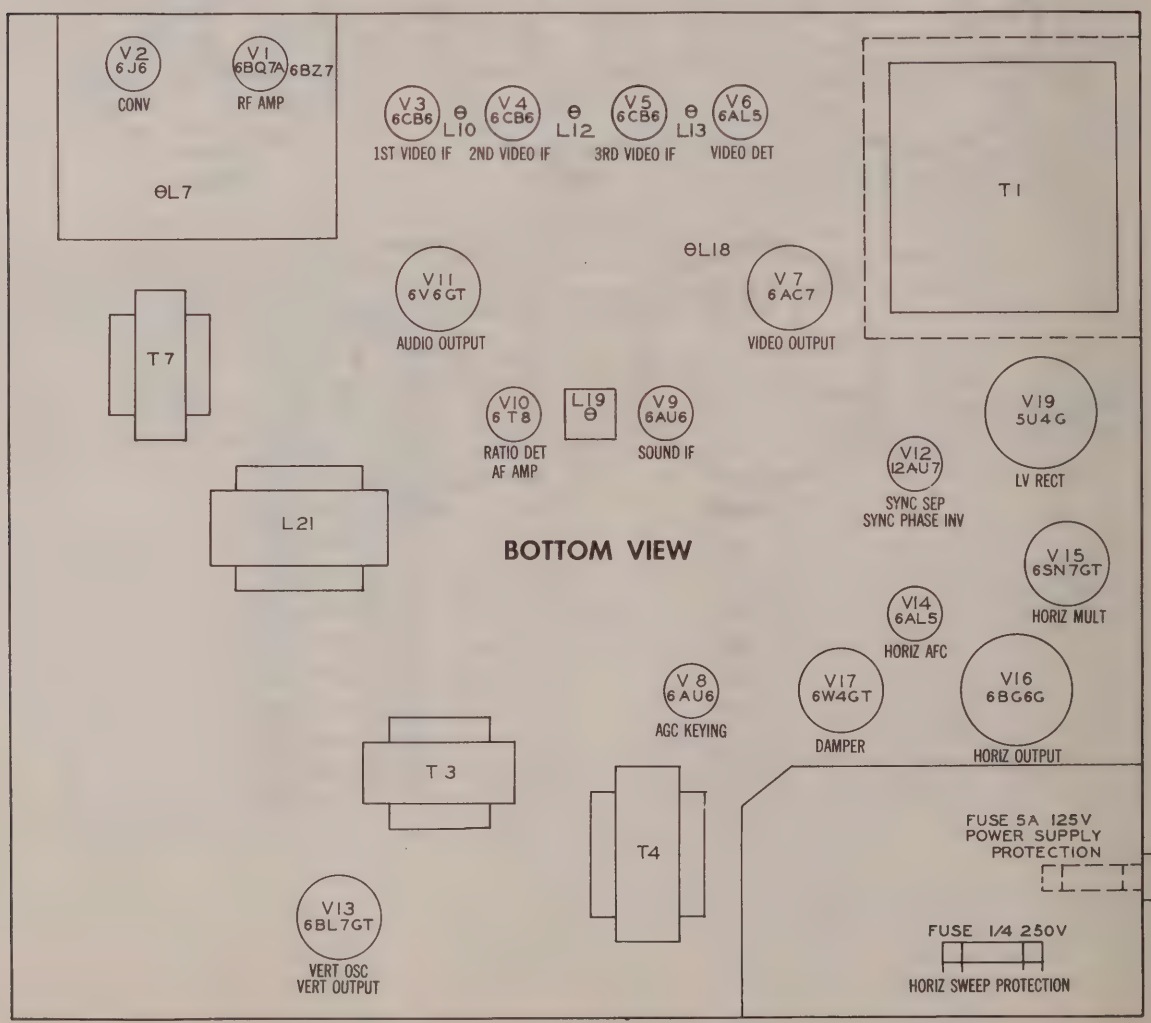


FIG. 5

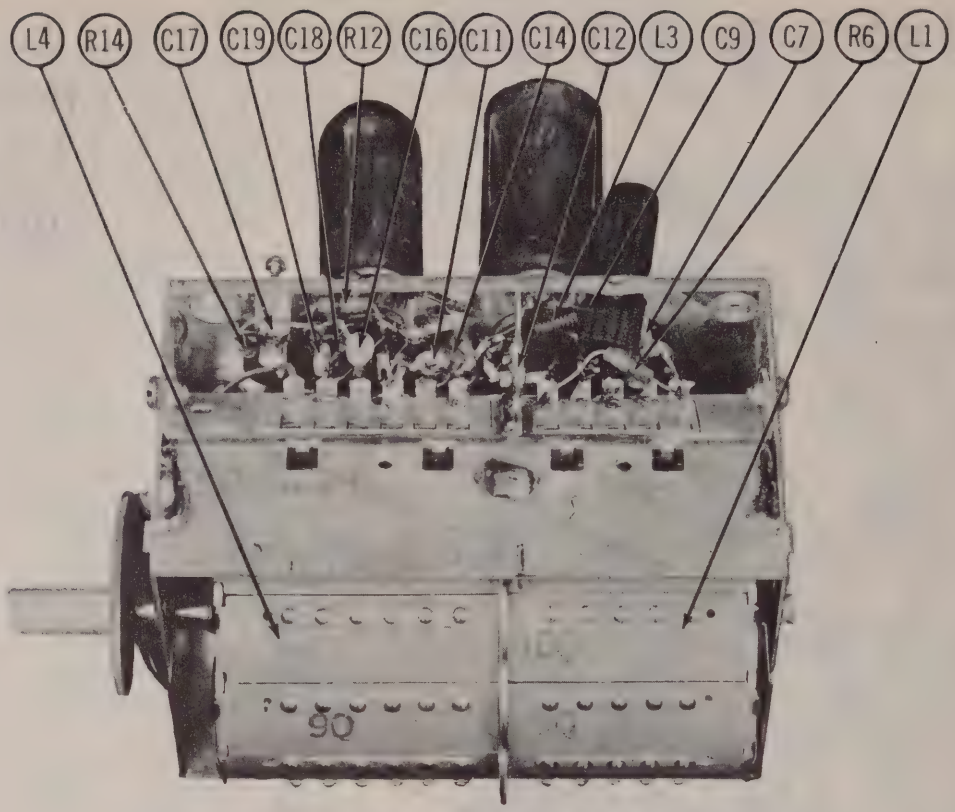
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BQ7A	INF	155KΩ	0Ω	.1Ω	0Ω	■2.6KΩ	150KΩ	INF	0Ω
V 2	6J6	■18,5KΩ	■3.5KΩ	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 3	6CB6	117KΩ	47Ω	.1Ω	0Ω	■3.7KΩ	■3.7KΩ	0Ω		
V 4	6CB6	110KΩ	47Ω	.1Ω	0Ω	■3.6KΩ	■3.6K	0Ω		
V 5	6CB6	.3Ω	150Ω	.1Ω	0Ω	■3.4KΩ	■3.4KΩ	0Ω		
V 6	6AL5	.3Ω	0Ω	.1Ω	0Ω	0Ω	0Ω	5.6KΩ		
V 7	6AC7	0Ω	.1Ω	0Ω	5.7KΩ	120Ω	■3.3KΩ	0Ω	■6.7KΩ	
V 8	6AU6	■46KΩ	■1.1KΩ	■1.1KΩ	■1.1KΩ	200KΩ	■55Ω	■1.1KΩ		
V 9	6AU6	470KΩ	0Ω	.1Ω	0Ω	■85KΩ	■85KΩ	82Ω		
V 10	6T8	1.1Meg	13.6KΩ	1.1Meg	0Ω	.1Ω	0Ω	0Ω	4.7Meg	■500KΩ
V 11	6V6GT	INF	0Ω	■2.5KΩ	■2KΩ	500KΩ	INF	.1Ω	270Ω	
V 12	12AU7	■14.8KΩ	■820KΩ	2.7KΩ	.1Ω	.1Ω	■820KΩ	2.7Meg	0Ω	0Ω
V 13	6BL7GT	2.2Meg	■2.5KΩ	1.4KΩ	1.7Meg	■1.6Meg	0Ω	0Ω	.1Ω	
V 14	6AL5	22KΩ	22KΩ	.1Ω	0Ω	4.8Meg	0Ω	4.8Meg		
V 15	6SN7GT	100KΩ	■270KΩ	1.5KΩ	5.2Meg	■4KΩ	1.5KΩ	.1Ω	0Ω	
V 16	6BG6G	470KΩ	0Ω	0Ω	INF	475KΩ	INF	.1Ω	■10KΩ	TOP CAP ▲30Ω
V 17	6W4GT	INF	INF	INF	INF	■70Ω	■65Ω	120KΩ	120KΩ	
V 18	1B3GT	PINS 1-8 HAVE INF RESISTANCE								TOP CAP ▲420Ω
V 19	5U4G	INF	100KΩ	INF	22Ω	INF	24Ω	INF	100KΩ	
V 20	17BP4A	0Ω	■330KΩ	PIN 10 ■55Ω	PIN 11 560KΩ	PIN 12 .1Ω				

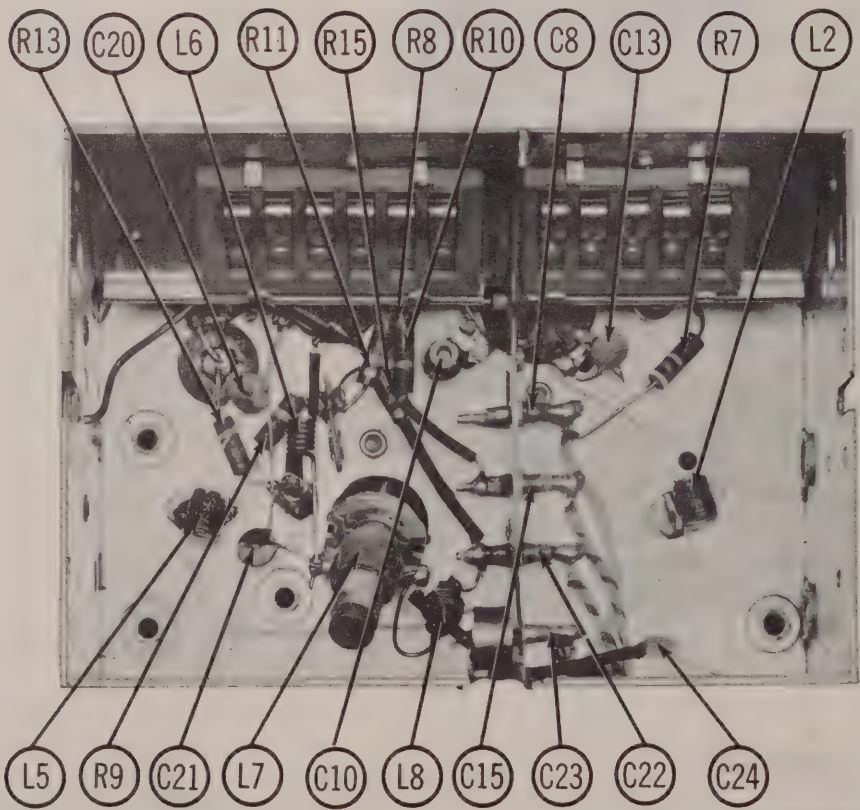
■ MEASURED FROM PIN 2 OF V19.
▲ MEASURED FROM PIN 3 OF V17.



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

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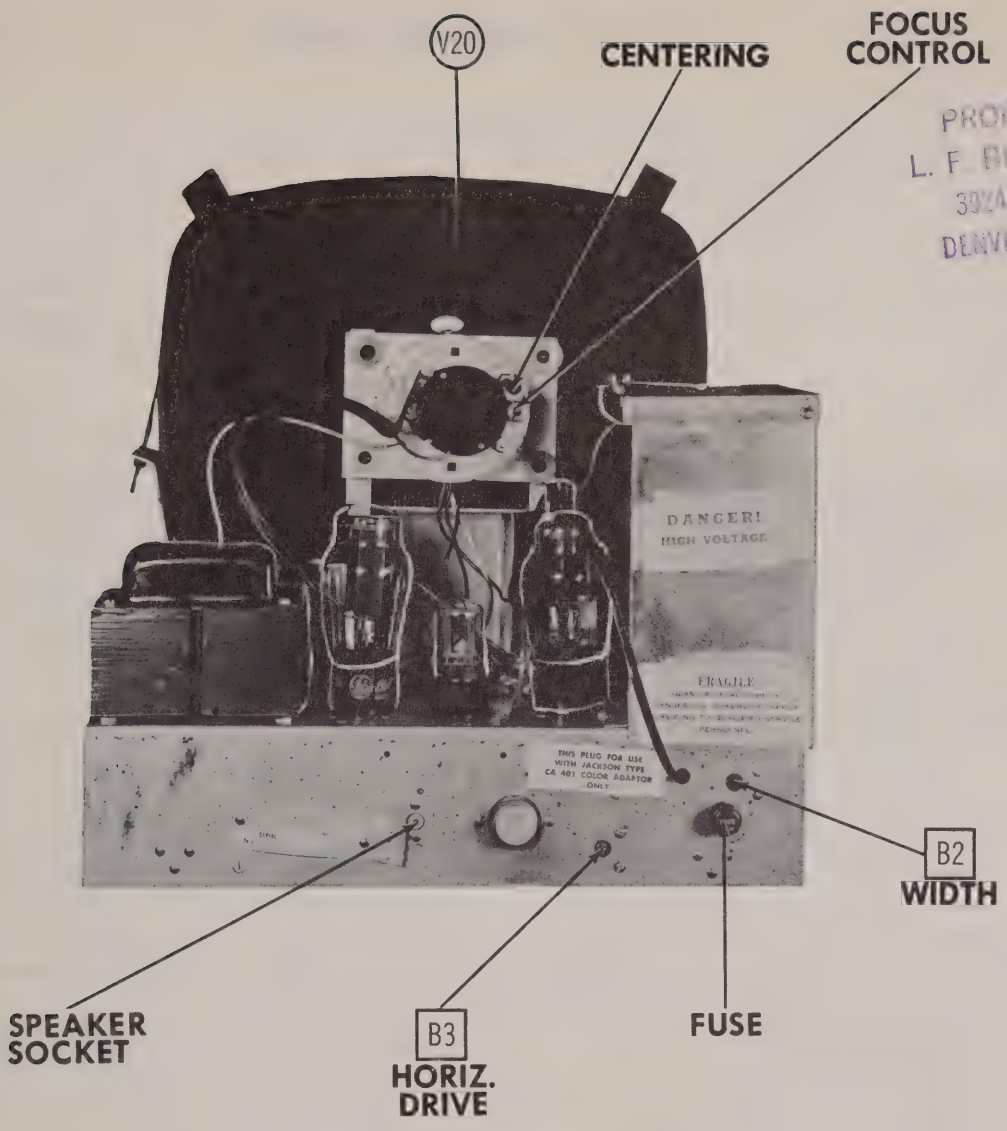


CHASSIS—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Adjust the horizontal hold slug (B1) until the picture synchronizes horizontally.

Turn the width control slug (B2) fully clockwise.

Adjust the horizontal drive trimmer (B3) for best compromise between maximum brightness and horizontal linearity.

Adjust B2 for a picture slightly wider than necessary to fill the picture mask horizontally.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

See "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V15, V16, V17, and V19. Check adjustments B2 and B3. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check C65, C66, C67, R77, T3, T5A and other associated circuit components.	Check C61, C62, C63, C64, R71, R72, R73, R74, L20 and other associated circuit components.

DRIVE LINES

Check adjustment of B3. Check by substitution V15, V16, and V17. Check T3, T5A and other associated circuit components.

COMPRESSED LEFT SIDE

Check by substitution V17, V16 and V15. Check T3, T5A and damper filter components.

FOLDS

Check by substitution V15, V16, and V17. Check associated circuit components especially T3 and T5A.

XMAS TREE EFFECT

Substitute V15. Check C61, C62, C63, and L20.

VERTICAL

LOSS OF SWEEP

Substitute V13. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check T4, T5B, R61, R60, R3 and other associated components.	Check T2, C54, C55, R57, R58, R5 and other associated circuit components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Check by substitution V13. Follow procedure outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Substitute V13. Check C54, C55, R58, R59 and other associated circuit components.

COMPRESSED AT TOP

Substitute V13. Check R60, C3C, T4, T5B and other associated components.

FOLDS

Substitute V13. Check associated circuit components.

SYNC

LOSS OF HORIZONTAL AND VERTICAL SYNC

Substitute V12. Check signal at W5 for overload and/or sync clipping.

If Satisfactory	If Unsatisfactory
Check components associated with V12.	Substitute V6, V7, and V8. Check components associated with these stages.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V14 and V15. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check components associated with V13 especially C59, C60, C61, C62, L20, R68, R69, R70, R71 and R72.	Check components that are associated with V12 and V14 especially R66, R67, C56 and C57.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Check by substitution V12 and V13. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T2 and other components associated with V13.	Check vertical integrator network.

HORIZONTAL BENDING OR S-ING

Substitute V15 and V16. Check horizontal AFC filter network for component failure or change of value.

VERTICAL JITTER

Substitute V12 and V13. Check associated circuit components especially C53, R56 and R2.

VIDEO

LOSS OF VIDEO

Substitute V7. Check picture tube and components associated with V7 and picture tube.

SOUND BARS (4.5MC BEAT)

Check adjustment of local oscillator in RF tuner. Check sound take-off adjustment, A5. Check video IF alignment.

NEGATIVE PIX

Check by substitution V7, V8, and V6. Check AGC network for proper operation. Check picture tube and other associated components. Check video IF tubes and alignment.

POOR CONTRAST

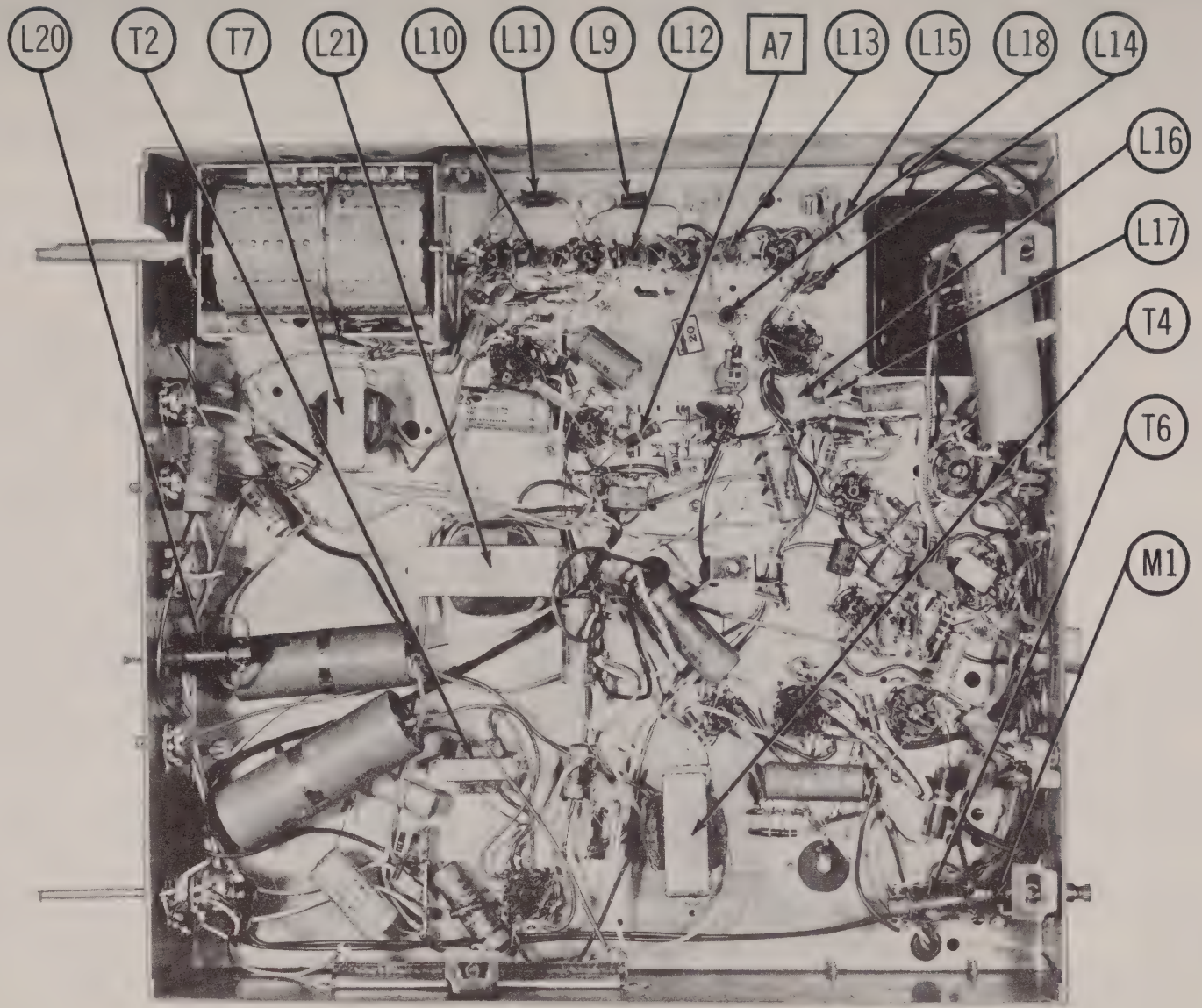
Check by substitution V6 and V7. Check components associated with these stages for change of value or failure. Check picture tube and associated circuit components. Check video IF tubes and alignment.

SMEAR

Substitute V6 and V7. Check L16 and L17. Check C35 and C36. Check R26, R27, R28 and R29 for change of value. Check picture tube and other associated circuit components.

WIDE BLACK BAR ACROSS PIX

Check V1, V2, V3, V4, V5, V6 and V7 for heater to cathode leakage.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

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L. F. BLAN

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: JACKSON PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RTMA BASE TYPE	NOTES
V1A	RF Amplifier	6BQ7A	6BQ7A	9AJ	*Not directly interchangeable with 6CB6
B	RF Amplifier	6BZ7	6BZ7	9AJ	
V2	Converter	6J8	6J8	7BF	
V3A	1st. Video IF Amp.	6CB6	6CB6	7CM	
B	1st. Video IF Amp.*	6AG5	6AG5	7BD	
V4A	2nd. Video IF Amp.	6CB6	6CB6	7CM	
B	2nd. Video IF Amp.*	6AG5	6AG5	7BD	
V5A	3rd. Video IF Amp.	6CB6	6CB6	7CM	
B	3rd. Video IF Amp.*	6AG5	6AG5	7BD	
V6	Video Detector	6AL5	6AL5	6BT	
V7	Video Output	6AC7	6AC7	8N	
V8	AGC Keying	6AU8	6AU8	7BK	
V9	Sound IF Amp.	6AU8	6AU8	7BK	
V10	Ratio Detector - AF Amplifier	6T8	6T8	9E	
V11	Audio Output	6V6GT	6V6GT	7S	
V12	Sync Separator-Sync Clipper	12AU7	12AU7	9A	
V13	Vert. Oscillator-Vert. Output	6BL7GT	6BL7GT	8BD	
V14	Horiz. AFC	6AL5	6AL5	6BT	
V15	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V16	Horiz. Output	6BG6G	6BG6G	5BT	
V17	Damper	6W4GT	6W4GT	6CG	
V18	HV Rectifier	1B3GT	1B3GT	3Q	
V19	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: JACKSON PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.	RTMA BASE TYPE	NOTES
V20A	17BP4A	17BP4A	17BP4A	12D	① Circuit changes necessary.
		17BP4B①	17BP4B	12D	
		17HP4①		12C	
		17RP4①		12C	
B	21EP4A	21EP4A	21EP4A	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: JACKSON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	40	450	CED4445	PRS450/40-46		BO45		2N537	TVA-2740	Red Red
B	40	450								
C2	80	450	CES8045	PRS450/80		BR8045A		ST845	TVA-1716	
C3A	10	450	CET3C45	PRS450/20-30		C1B		4N723	TVL-3817	Blue Red Green
B	20	450								
C	150	50		PRS50/100						
C4	8			PRS450/8		BR845A		TC7I	TVA-1704	Note 1
C5	25	25	CES2008	PRS25/25		BR252A		TC26	TVA-1205	
C6	4	50	CES8405	PRS150/4		BR4I5		TC30	TVA-1303	
C7	3-8		CVC05090ST		829-10				503C-D1	
C8	800		CBZ5082Y	EF-001	MFT-1000					
C9	3.6		CDC05039C							
C10	.5-3		CVC05087		829-3			CT585A		
C11	47		CDP05470K	BPD-000047	D6-470		GP1K-470	UC-5447	5GA-Q47	
C12	800		CBZ05802Y	EF-001	MFT-1000				503C-D1	
C13	1000		CDZ05102Y	BPD-001	DD-102	TM5D1	501-001	DC-521	5HK-D1	
C14	1.5		CDC05015C	SIL.5NP0	TCZ-1.5		NP0K-1R5	ZT-5515	5TCCB-V15	
C15	800		CBZ05802Y	EF-001	MFT-1000				503C-D1	
C16	47		CDP05470K	BPD-000047	D6-470		GP1K-470	UC-5447	5GA-Q47	
C17	.5-3		CVC05087		829-3			CT585A		
C18	10		CDC05106K	SIL0NP0	TCZ-10		NP0K-100	ZT-541	5TCC-Q1	
C19	5		CDU05056D	SIL5N750	TCN-5		N750K-050		5TCUB-V5	
C20	1000		CDZ05102Y	BPD-001	DD-102	TM5D1	501-001	DC-521	5HK-D1	
C21	6.8		CDC05068C	SIL.5NP0	TCZ-6.8		NP0K-6R8	ZT-5568	5TCCB-V68	
C22	800		CBZ05802Y	EF-001	MFT-1000				503C-D1	
C23	800		CBZ05802Y	EF-001	MFT-1000				503C-D1	
C24	120		CUV05I2K	BPD-00012	D6-I2I	TM5T12	GP3K-I2I	UC-5312	5GA-T12	
C25	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C26	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C27	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C28	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C29	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C30	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C31	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C32	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C33	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C34	6.8			SI6.8NP0	TCZ-6.8		NP0K-6R8	ZT-5568	5TCCB-V68	Note 1
C35	10000		CDZ05103Y	BPD-01	DD-1032	TM56I	5I1-01	DC-5I1	5HK-5I	
C36	.1	400	CPZ04104M	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C37	.1	400	CPZ04104M	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C38	.20	200		1468-00025	D6-221	5W5T25	GP2K-221		1FM-325	Note 2
C39	.5	200	CPZ02504M	P288-5		PT2P5		PT405	2TM-P5	Note 3
C40	2.7									Note 4
C41	47			SI47N750	TCN-47		N750K-470	NT-5447	5TCU-Q47	Note 5
C42	39			SI39	D6-390		GP1K-390	UC-5439	5GA-Q39	Note 6
C43	10000		CDZ05103Y	BPD-01	DD-1032	TM56I	5I1-01	DC-5I1	5HK-5I	
C44	10000		CDZ05103Y	BPD-01	DD-1032	TM56I	5I1-01	DC-5I1	5HK-5I	Note 1
C45	330	500	CMA05331M							
C46	1500	500	CMA05152M		D6-152		GP2L-152		1FM-215	
C47	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C48A	.01						†1406-01		†102C1	
B	.250		†A-1376-6F	†PA-112-3	†PC-80					
C										
C49	.005	600	CWZ06503M	P688-005	D6-502	PTE6D5	GP2-333-502	PT625	6TM-D5	
C50	.05	400	CPZ04503M	P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C51	220	500	CMA03221M	1468-00025	D6-221	5W5T25	GP3K-221		1FM-326	
C52A	.002					PTE6D2		PT622		
B	.005		sA-1375-6F	sPA-110	sPC-100	PTE6D5	s1406-01	PT625	s103C1	
C	.005					PTE6D5		PT625		

PARTS LIST AND DESCRIPTIONS

CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: JACKSON PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C53	.005	600	CPZ05503M	P688-005	D6-502	PTE6D5	GP2-333-502	PT625	6TM-D5	Note 7
C54	.05	600	CPZ05503M	P688-05	DF-503	PTE6S5		PT615	6TM-S5	
C55	.1	600	CPZ 06104M	P688-1	DF-104	PTE6P1		PT601	6TM-P1	
C56	1000	500	CMA05102K	1468-001	D6-102	1WD1	GP2L-102		1FM-21	
C57	1000	500	CMA05102K	1468-001	D6-102	1WD1	GP2L-102		1FM-21	
C58	.01	600	CPZ06103M	P688-01	D6-103	PTE6S1	GP2-333-103	PT611	6TM-S1	
C59	5000		CDZ05502Y	BPD-005	MD-502	TM5D5	5I1-005	DC-525	5HK-D5	
C60	10000		CDZ05103Y	BPD-01	DD-1032	TM56I	5I1-01	DC-5I1	5HK-5I	
C61	.0039	600	CMD06392K	1464-004		IDR5D4			MS-24	
C62	330	500	CMA05331K	1469-00035						
C63	390	500	CMA05391K	1469-0004		5R5T4			MS-24	
C64	.01	600	CPZ06103M	P688-01	D6-103	PTE6S1	GP2-333-103	PT611	6TM-S1	
C65	.05	400	CPZ05503M	P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C66	.25	600	CPZ06254M	664-25		PTE6P25		PT6025	6TM-P25	
C67	.25	200	CPZ02254M	P288-25		PT2P25		PT4025	2TM-P25	
C68	500	20000	CDZ20K501	HV20C	TV3-502	MM-C20T5	413-501	HV20035A	20DK-T5	
C69	10000		CDZ05103Y	BPD-01	DD-1032	TM56I	5I1-01	DC-5I1	5HK-5I	
C70	56	2000	CMA05060K							

Note 1. Not used in all Models.
Note 2. Some Models use .001MFD in this application (part #CPZ06102M).
Note 3. Some Models use 1.0MFD in this application.
Note 4. Some Models use 6.8MMF in this application (part #CCC05068K).
Note 5. Not used in some Models, others use 20MMF in this application.
Note 6. Some Models use 20MMF in this application (part #CCC05200K).
Note 7. Some Models use .01MFD in this application.
† Items C48A, C48B, C48C, R46A, R46B are combined in one unit. when replacing items separately C48B and C48C should total 250MMF.
♦ Items C52A, C52B, C52C, R56A, R55B, R55C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: JACKSON PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1000Ω	½	RVM-1005	QJ-258*	RTV-386		UF13L	Contrast - Panel
B	1Meg	½	Not Req.		Not Req.		UR16A	Volume-Rear
C	Switch		Not Req.		Not Req.		UR-28	Attach to R1B
R2A	3Meg.	½	RVC-102N	QU-140	AG-85-8	AB-84	U-59	Vert. Hold-Note 1
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R2A
R3A	5000Ω	2	RVC-103N		A43-5000	VK-135	R5000L	Vert. Linearity
B	Shaft		Not Req.		FKS-1/4	Not Req.	Not Req.	Attach to R3A
R4A	250Kf.	½	RVC-100N	QU-130	AG-55-8	AB-50	SU-46	Brightness
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	1Meg	½	RVC-101N	QU-137	AG-81-8	AB-59	SU-54	Height- Note 2
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R5A

*CONCENTRIKIT EQUIVALENT-KIT K-2 BASE ELEMENTS & SHAFT QU-108-P1-204 (PANEL)
QU-137 & R2-216 (REAR) & SWITCH 76-1

Note 1. Some models may use a 1Meg control in this application.
Note 2. Some models may use a 3Meg control in this application.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: JACKSON PART No.	IRC PART No.	NOTES
R6	15KΩ	½		BTS-15K	
R7	47KΩ	½	RCC472M		
R8	100KΩ	½		BTS-100K	
R9	160KΩ	5% 1			
R10	1500Ω	½	RCC153M	BTS-1500	
R11	100KΩ	5% ½			
R12	10KΩ	½		BTS-10K	
R13	220KΩ	½			
R14	10KΩ	½		BTS-10K	
R15	15KΩ	½			
R16	6800Ω	½	RCC682K	BTS-6800	
R17	47Ω	½	RCC470K	BTS-47	
R18	22KΩ	½	RCC223K	BTS-22K	
R19	150Ω	½	RCC151M	BTS-150	
R20	47Ω	½	RCC470K	BTS-47	
R21	5600Ω	½	RCC562K	BTS-5600	
R22	150Ω	½	RCC151M	BTS-150	
R23	150Ω	½	RCC151M	BTS-150	
R24	150Ω	½	RCC151M	BTS-150	
R25	5600Ω	½	RCC562K	BTS-5600	Note 3
R26	470Ω	½	RCC471M	BTS-470	
R27	27Ω	½	RCC270M	BTS-27	
R28	680KΩ	½	RCC684M		
R29	5600Ω	1		BTA-5600	
R30	560KΩ	½	RCC564M	BTS-560K	
R31	390KΩ	½	RCC394M	BTS-390K	
R32	39KΩ	½		BTS-39K	
R33	18KΩ	½	RCC183M	BTS-18K	
R34	470KΩ	½	RCC474M	BTA-470K	
R35	100KΩ	½	RCC104M	BTS-100K	
R36	100KΩ	½	RCC104M	BTS-100K	
R37	10KΩ	½	RCC103M	BTS-10K	
R38	150Ω	½	RCC151M	BTS-150	
R39	470KΩ	1		BTA-470K	
R40	82Ω	½	RCC820M	BTS-82	
R41	82KΩ	1		BTA-82K	
R42	47KΩ	½	RCC473M	BTS-47K	
R43	6800Ω	½	RCC682K	BTS-6800	
R44	6800Ω	½	RCC682K	BTS-6800	
R45	4.7Meg	½	RCC475M	BTS-4.7Meg	Note 4

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: JACKSON PART No.	IRC PART No.
R46A	500KΩ	½	†A-1376-6F	†BTS-500K
B	500KΩ	½		†BTS-500K
R47	270Ω	1	RCF271M	BTA-270
R48	1000Ω	1		BTA-1000
R49	470KΩ	½	RCC474M	BTS-470K
R50	2.2Meg	½	RCC225M	BTS-2.2Meg
R51	820KΩ	½	RCC824M	BTS-820K
R52	4700Ω	½	RCC472K	BTS-4700
R53	6800Ω	½	RCC682K	BTS-6800
R54	2700Ω	½	RCC272K	BTS-2700
R55A	22KΩ	½		BTS-22K
	H6200Ω	1	♦A-1375-6F	BTS-6200
	C6200Ω	1		BTS-6200
R56	1.5Meg	½	RCC155M	BTS-1.5Meg
R57	1.5Meg	½	RCC155M	BTS-1.5Meg
R58	2.2Meg	½	RCC225M	BTS-2.2Meg
R59	8200Ω	½	RCC823K	BTS-8200
R60	470Ω	½	RCC471M	BTS-470
R61	1000Ω	½	RCF102M	BTA-1000
R62	560Ω	½	RCC561K	BTS-560
R63	560Ω	½	RCC561K	BTS-560
R64	1000Ω	1		BTS-1000
R65	22KΩ	½		BTA-22K
R66	100KΩ	½	RCC104K	BTS-100K
R67	100KΩ	½	RCC104K	BTS-100K
R68	4.7Meg	½	RCC475M	BTS-4.7Meg
R69	470KΩ	1	RCC474M	BTA-470K
R70	150Ω	½	RCC152K	BTS-1500
R71	3900Ω	½	RCC392K	BTS-3900
R72	100KΩ	½	RCC104K	BTS-100K
R73	270KΩ	½	RCC274K	BTS-270K
R74	4700Ω	½		BTS-4700
R75	470KΩ	1		BTA-470K
R76	47Ω	½	RCQ103M	BT S-47
R77	10KΩ	2	RCQ103M	BTB-10K
R78	5.3Ω	½	RCC033K	
R79	220KΩ	½	RCC224M	BTS-220K
R80A	2300Ω	9	RWT332K	
B	1000Ω	12	RWT332K	
R83	680KΩ	½	RCC684M	BTS-680K

† Items R46A, R46B, C48A, C48B, C48C, are combined in one unit.
♦ Items R55A, R55B, R55C, C52A, C52B, C52C are combined in one unit.
Note 1. Some Models may use a 1Meg resistor in this application.
Note 2. Some Models may use a 10KΩ resistor in this application.
Note 3. Some Models may use a 6800Ω resistor in this application.
Note 4. Used in late production models only.
Note 5 Some Models use a 4700Ω resistor in this application.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: JACKSON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No	RCA TYPE NO.
T1	117VAC @1.76A	680VCT .230ADC	5VAC ② 3A	6.3VAC @1.5A SEC. 4 6.3VAC @7.4A	B-1850-13	P-8186① ②				

① Drill new mounting holes.
② Parallel the two 6.3V., 5A. winding and use as Sec. 4.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI	RATING: DC RESISTANCE SEC	REPLACEMENT DATA: JACKSON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	RCA TYPE No.	NOTES
T2	180Ω	1000Ω	A-1681-13	A-8125	A-3003	TSO-5	A-97X	209T1 ⑩	Vert.Osc. Trans. Horiz.Output Trans.
T3A	420ΩTap @330Ω	12.6Ω tap @1.6Ω, 8.1Ω SEC. 2 0Ω	B-1675-13A B-1676-13A①	A-8156② ③	HVO-10② ④	TFB-8② ⑤			
B			C-1677-13A③ B-1682-13	A-8123	A-3037	TSO-8④	A-102X	223T1	Vert.Output Trans.
T4	1430Ω tap @11Ω								
T5A	10Ω		B-1452-9	DY-8A ⑦	MDF-70	TY02 ⑧	Y-12 ⑦	206D1 ⑧	Horiz.Deflection Coils
B	58Ω								Vert.Deflection Coils
T6A	.27Ω	35Ω	B-1467-10						Width Coil & AGC winding
B			A-1486-10 ⑨						Width Coil

① Alternate horizontal output transformer.
② Use original mounting bracket or drill new mounting holes.
③ Connect as in original circuit.
④ Connect as in original circuit, except, connect original terminal #6 to new terminal #8, original #7 to new #6.
⑤ Connect original terminal #1 to new terminal #1, original #4 to new #7, original #5 to new #4, original #6 to new #5, original #7 to new #6.
⑥ Connect as auto transformer.
⑦ Use original horizontal deflection coil network, if necessary.
⑧ Use original deflection coil network.
⑨ Used in Ch.317B and 321B only.
⑩ Drill one new mounting hole.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC	REPLACEMENT DATA: JACKSON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	NOTES
T7	5 2KΩ	3.2Ω	550Ω	.5Ω	A-1654-13 B-1653-13①	A-3823	A-3019	R0-303	S-5X	

① Alternate output transformer.

SPEAKER

ITEM No.	RATINGS: SIZE	FIELD	V C. IMP.	REPLACEMENT DATA: JACKSON PART No.	JENSEN PART No.	QUAM PART No.	NOTES
SP1A	5"	PM	3.2Ω	B-1654-13	ST-105 Mod. P5-X	5A1	① Used in 17" console models. ② Used in 21" console models ③ 10" PM speaker used in model 472.17XUCM. 9
B	6"	PM	3.2Ω	B-4600-15①	ST-108 Mod. P6-X	6A1	
C	8"	PM	3.2Ω	B-4604-15②	ST-115 Mod. P8-V	8A21	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: JACKSON PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coils	0Ω	0Ω					
L2	Fil. Choke	0Ω						
L3	Neutr. Coil	0Ω						
L4	RF, Mixer Grid & OSC. Coils	0Ω						
L5	Fil. Choke	0Ω						
RF6	RF Choke	0Ω						
L7	1st Video IF	1Ω						
L8	RF Choke	1.3Ω						
L9	Fil. Choke	0Ω		A-1481-10	19-3001	TV-189	6175	.3Microhenry
L10	2nd Video IF	.3Ω	.3Ω	B-1471-10	17-1062		6250	
L11	Fil. Choke	0Ω		A-1481-10	19-3001	TV-189	6175	.3Microhenry
L12	3rd Video IF	.3Ω	.3Ω	B-1471-10	17-1063		6249	
L13	4th Video IF	.3Ω	.3Ω	B-1471-10	17-1064		6250	
L14	Series Peaking Coil	4.6Ω		A-1482-10	19-3125		6153	130 Microhenries Some models use 36 Microhenries Series Peaking Coil (Part #A-1469-10).
L15	Shunt Peaking Coil	15Ω		A-1485-10	19-3660	TV-188	4650	600Microhenries Some models use 120 Microhenries Shunt Peaking Coil (Part # A-1482-10).
L16	Series Peaking Coil	7.5Ω		A-1483-10	19-3250*	TV-185*	4648*	240Microhenries wound on 18KΩ Resistor.
L17	Shunt Peaking Coil	10Ω		A-1484-10	19-3500	TV-188	4648	380Microhenries
L18	Sound IF	1.5Ω		14A-1477-10	17-3400	TV-151	1469	
L19	Ratio Det.	4Ω	.2ΩCT	B-1472-10	17-1033	TV-110	1468	Tertiary Winding- .5Ω
L20	Horiz. Osc.	50Ω		A-1479-10	19-1575	TV-163†	6210†	

* Parallel with 18KΩ Resistor
† Enlarge Mtg. Hole

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	JACKSON PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
L21	.230A	55Ω	2.2HY	A-1651-13 B-1651-10②	C-2325	C-2974①	TR-4200①	C-23X

① Drill one new mounting hole.
② Alternate filter choke.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			JACKSON PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG	5A 250V	A-3751-30		312005 (5A-3AG)	342001	MTH5	HKP
M2	3AG	1/4A 250V	A-3750-30		312.250 (1/4A-3AG)	357001	AGC1/4	4405

MISCELLANEOUS

ITEM No.	PART NAME	JACKSON PART No.	NOTES
M3	RF Tuner	A-4112-33	Cascode, Standard Coil
M4	Focus Magnet	B-4101-33	Includes Centering Assembly
M5	Ion Trap	A-4102-33	
B4	Trimmer Cap	CVM501ST	Horiz. Drive 50-500MMF
	Knob	A-1054-4	Channel Selector-all standard models
	Knob	A-1055-4	Fine Tuning-all standard models
	Knob	A-1056-4	Off-On Volume-all standard models
	Knob	A-1057-4	Contrast-all standard models
	Safety Glass	B-4623-25	17" standard models
	Safety Glass	B-4624-25	21" standard models
	Mask	B-4870-1	17" standard models
	Mask	B-4872-1	21" standard models
	Knob	A-1050-4	Channel Selector-all deluxe models
	Knob	A-1051-4	Fine Tuning-all deluxe models
	Knob	A-1052-4	Off-On Volume-all deluxe models
	Knob	A-1053-4	Contrast-all deluxe models
	Safety Glass	B-4611-25	17" deluxe models
	Safety Glass	B-4612-25	21" deluxe models
	Mask	B-4359-35	17" deluxe models
	Mask	B-4361-35	21" deluxe models
	Back Cover	C-1702-19	All 17" Models
	Back Cover	C-1705-19	All 21" Models

TROUBLE SHOOTING AIDS (cont)

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AUDIO

WEAK OR NO SOUND

Check by substitution V9, V10, and V11. Check stages of V10B and V11 using audio signal generator.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and circuit components.	Check components associated with V10B and V11.

BUZZ

Check adjustment of local oscillator. Adjust A7 for mimimum buzz. If buzz is still objectionable substitute V10 and readjust A6 and A7. Check components associated with V10A.

DISTORTED OR GARBLED

Check by substitution V9, V10, and V11. Check stages of V10B and V11 using an audio signal generator and scope. Apply audio signal across R45. Connect scope across primary of T7.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components that are associated with V10B and V11.

POWER

DEAD SET

Check fuse M1, AC interlock assembly, switch on volume control and T1.

SMALL AND/OR DIM PIX

Substitute V19. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check fuse M2. Check by substitution V15, V16, V17 and V18. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check R78, R81, C68, T3, T5A, C65, R77 and other components.	Check C62, C63, C64, R70, R71, R72, R73, R74, R75 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V15, V16, V17, V18 and V19. Check picture tube. Proceed as outlined under "Loss of High Voltage".

BLOOMING

Check by substitution V18, V19, V17, V16 and V15. Check R78, R81, C68, T3, T5A, C65, R77, picture tube and other associated components.

GENERAL

RASTER SOUND NO PIX

See "Loss of Video".

RASTER NO SOUND NO PIX

Check by substitution V1, V2, V3, V4, V5, V6 and V7. Check associated circuit components.

NO RASTER NO SOUND

See "Dead Set".

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this receiving equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs (behind metal plug). The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the channel selector shaft.

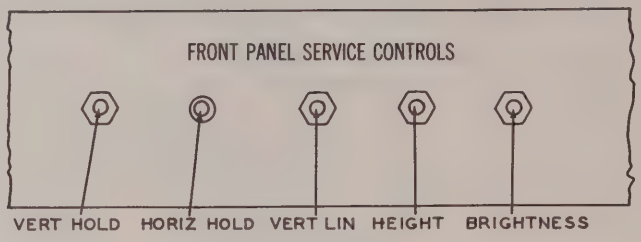
PICTURE TUBE SAFETY GLASS CLEANING

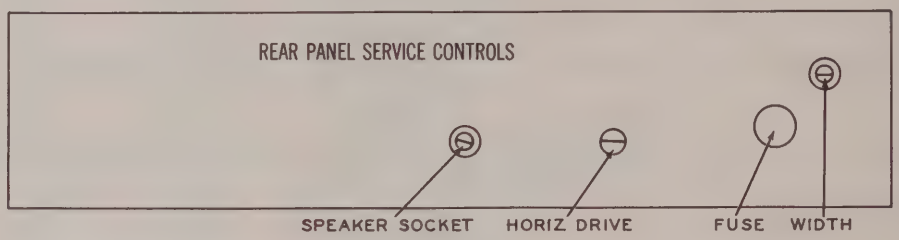
For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

SERVICE ADJUSTMENT LOCATION





HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjust the horizontal horizontal hold slug (L20) until picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector buzz, adjust the ratio detector secondary (L19) located on bottom of chassis. (See tube placement chart).

FUSES

Two fuses are used. One for horizontal sweep circuit protection and one LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

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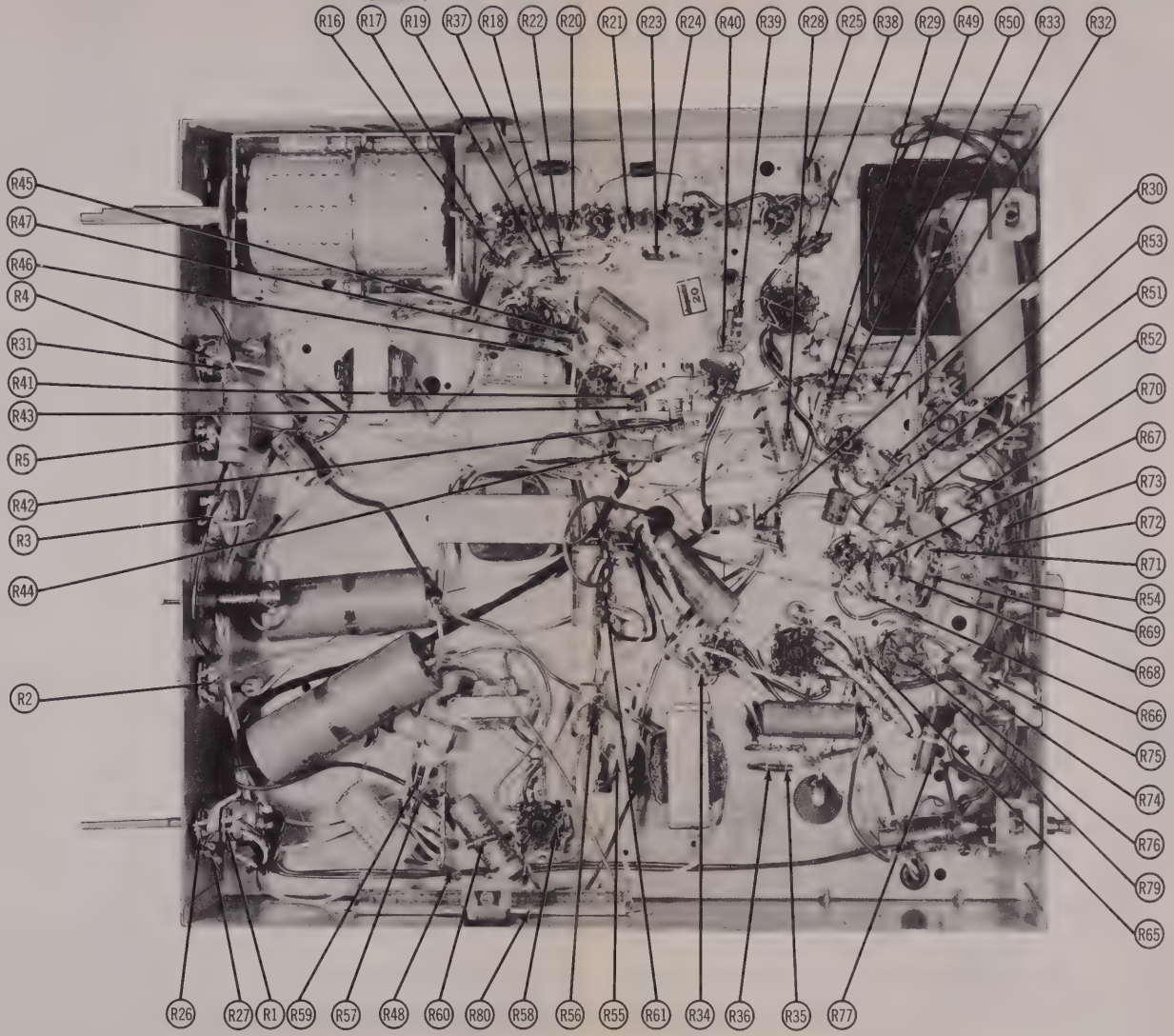

CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PHOTOFACT* Folder

RETMA MEMBER

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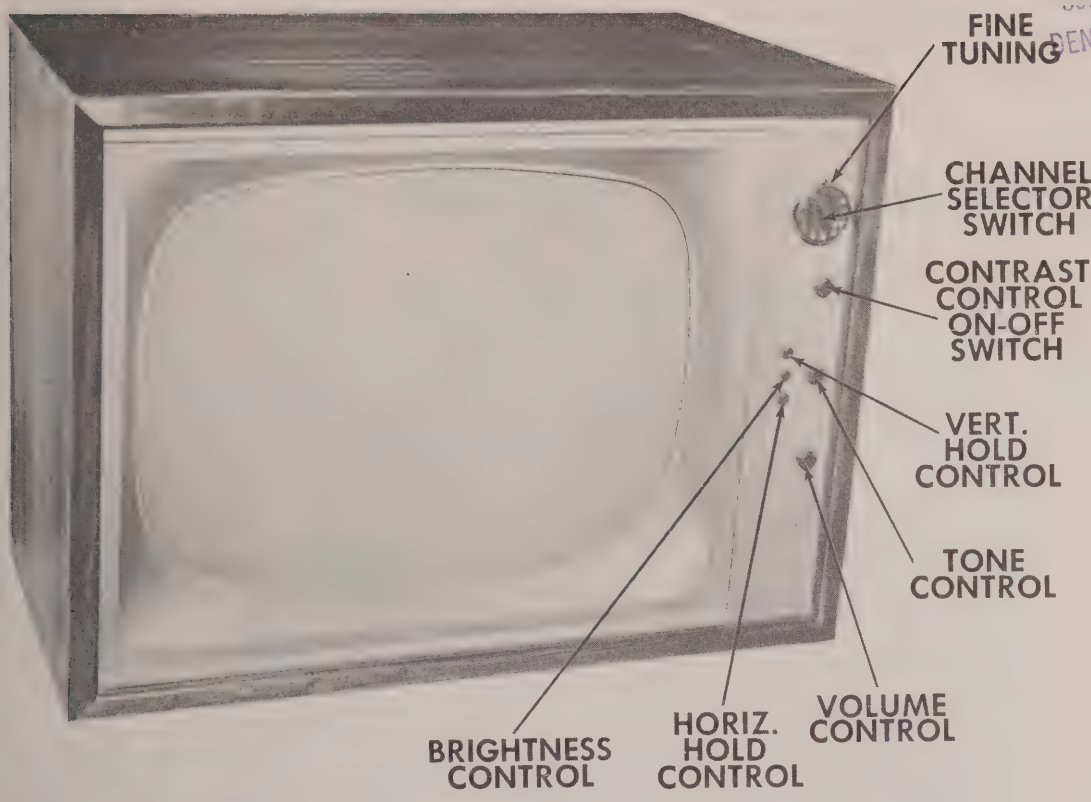

MAGNAVOX
CHASSIS CT358 (107 Series)

TRADE NAME	Magnavox Ch. CT358 107 Series)
MANUFACTURER	Magnavox Co., 2131 Bueter Rd., Fort Wayne 4, Indiana
TYPE SET	Television Receiver
TUBES	Twenty-Seven
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 2.66 Amp. @ 117 Volts AC
TUNING RANGE–	Channels 2 thru 13, Video IF 45.75MC, Sound IF 41.25MC (Intercarrier)

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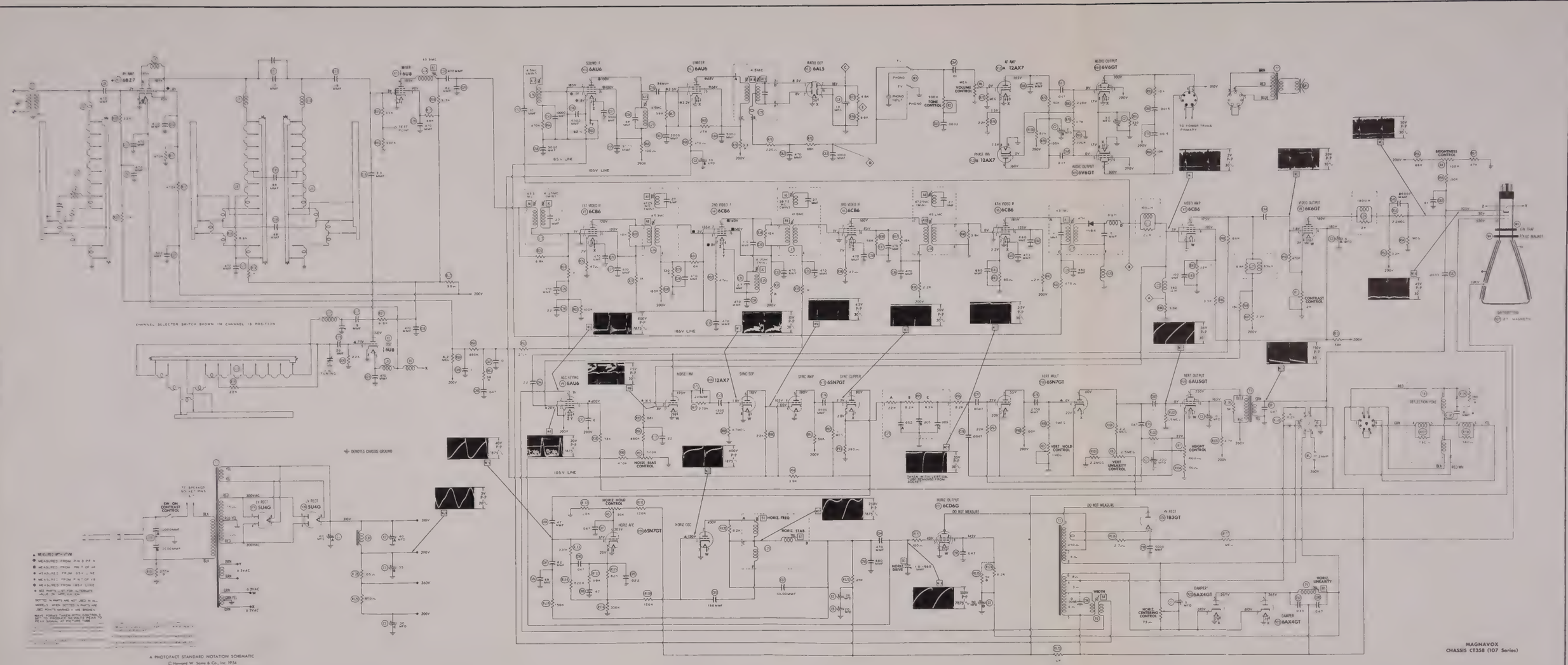
MAGNAVOX
CHASSIS CT358 (107 Series)
CHANNEL SELECTOR SWITCH SHOWN IN CHANNEL 13 POSITION
DENOTES CHASSIS GROUND
A PHOTOFACT STANDARD NOTATION SCHEMATIC
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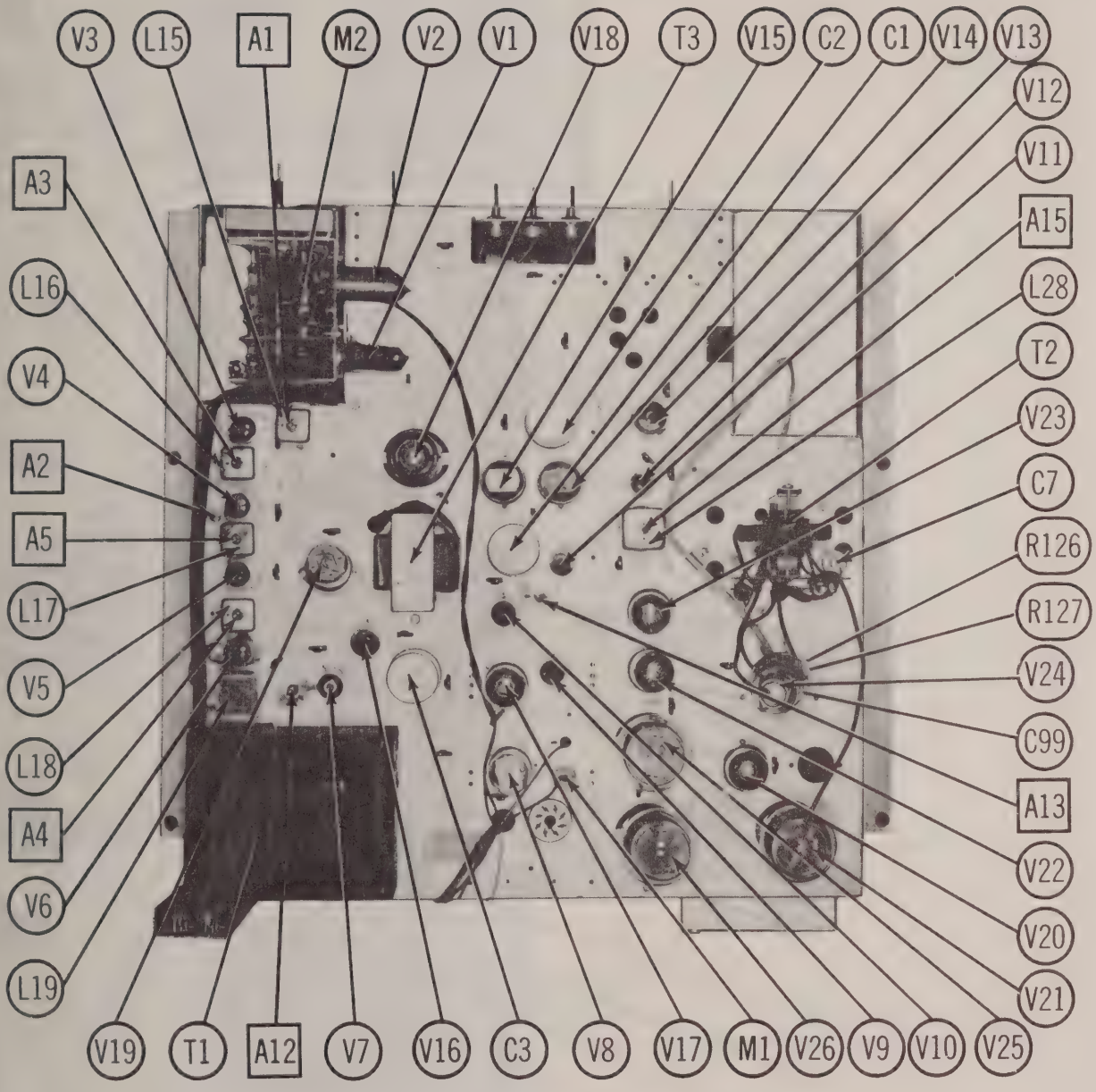
MAGNAVOX
CHASSIS CT358 (107 Series)



CHASSIS TOP VIEW

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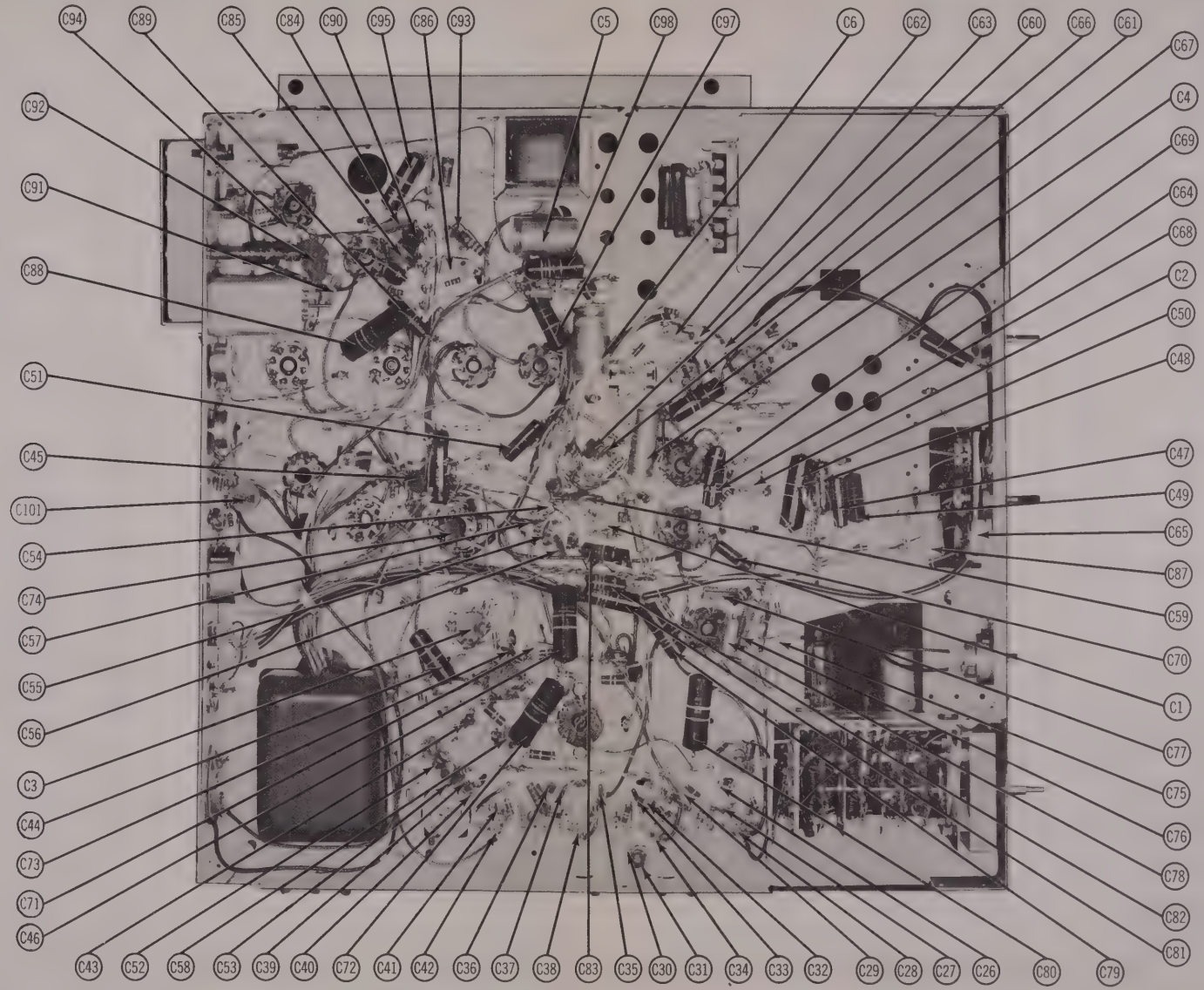

CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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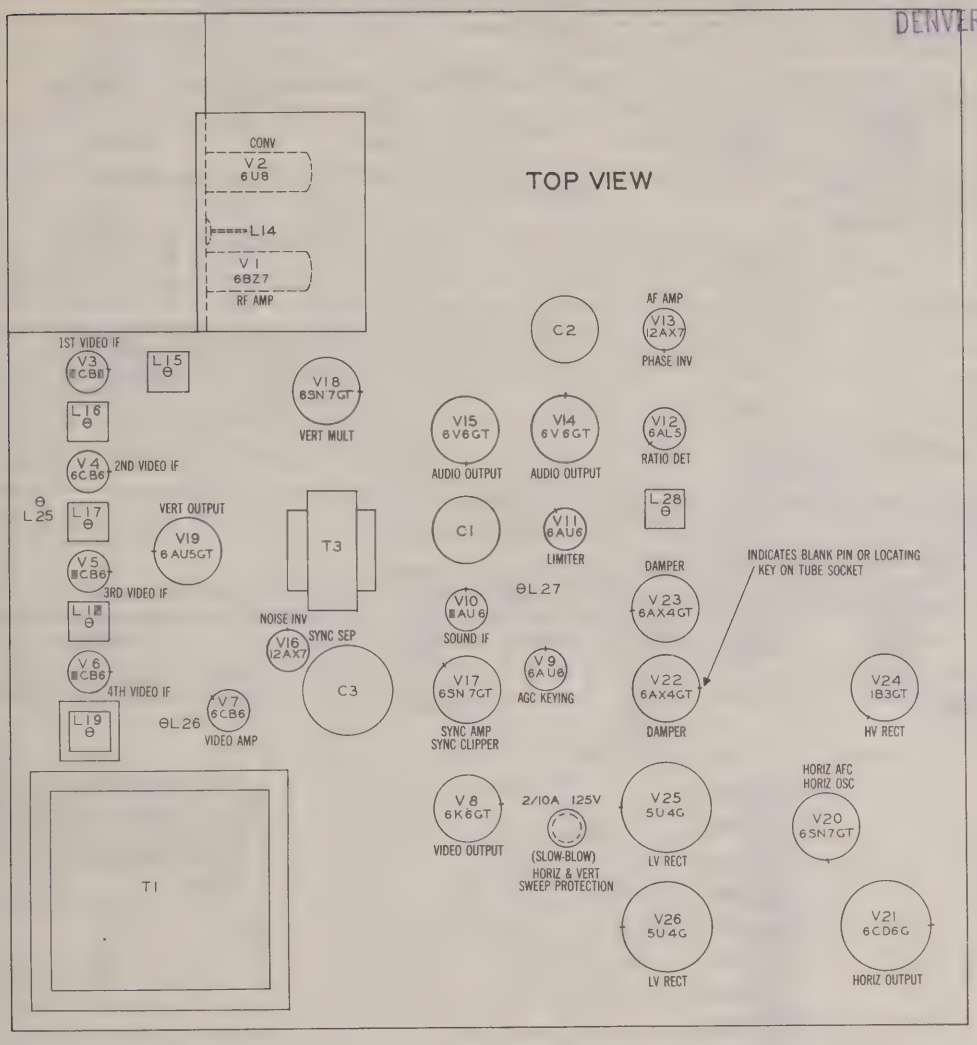
TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V25, V26

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V2, V3, V4, V5, V6
No pic, no sound, has snow - V1, V2, V3
No pic, has sound, has raster - V7, V8, V27
Has pic, no sound - V10, V11, V12, V13, V14, V15
Overloaded picture - V9

SYNC FAILURE
No vert. sync - V17, V18, V19
No horiz. sync - V17, V20
No vert. or horiz. sync - V16, V17

SWEEP FAILURE
No raster, has sound - V20, V21, V22, V23, V24, V27, Fuse (M1)
No vertical deflection - V18, V19
Poor vert. linearity or foldover - V18, V19
Poor horiz. linearity or foldover - V20, V21, V22, V23
Narrow picture - V20, V21, V22, V23, V24, V25, V26
Vert. off freq. - V17, V18, V19
Horiz. off freq. - V17, V20

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis.
Do not remove the horizontal oscillator tube to disable the high voltage.

VIDEO IF ALIGNMENT

Obtain a 4.5 volt bias source with tap at -1.5 volts. Connect -4.5 volt lead to the ungrounded side of C26. Connect the -1.5 volt tap to the ungrounded side of C49. Connect the positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over converter tube. (V2) Low side to chassis.	41.25MC	4	DC probe to point (A) Common to chassis.	A1, A2	Adjust for minimum deflection.
2.	"	"	47.25MC	"	"	A3, A4	"
3.	"	"	39.75MC	"	"	A5	"
4.	"	"	43.3MC	"	"	A6, A7	Detune A7 from maximum then adjust A6 and A7 in order given for maximum deflection.
5.	"	"	45.3MC	"	"	A8	Adjust for maximum deflection.
6.	"	"	41.8MC	"	"	A9	"
7.	"	"	45.2MC	"	"	A10	"
8.	"	"	43.1MC	"	"	A11	"

Note. If above adjustments A6 through A10 require more than 3 turns readjust the associated trap.

OVERALL RF AND VIDEO IF RESPONSE CHECK

Leave bias battery connected as under Video IF Alignment.
Use separate marker generator connected to floating tube shield as under Video IF Alignment.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Fig. 1	Thru matching network (Fig. 1) to antenna terminals	69MC (10MC Swp)	39.75MC 41.25MC 45.0MC 45.75MC 47.25MC	4	Vert. Amp. to point (A). Low side to chassis.		Check for response as in Fig. 2. If necessary retouch A6 thru A-11 for desired response.
10.	"	"	213MC (10MC Swp)	"	13	"		Check for response as in Fig. 2. If necessary retouch A8, A9, A10 and A11 slightly for best compromise on all channels. A-11 affects tilt, A9 affects low frequency side of response curve and A8 and A10 affect the high frequency side of response curve.
			207MC (10MC Swp)		12			
			201MC (10MC Swp)		11			
			195MC (10MC Swp)		10			
			189MC (10MC Swp)		9			
			183MC (10MC Swp)		8			
			177MC (10MC Swp)		7			
			85MC (10MC Swp)		6			
			79MC (10MC Swp)		5			
			63MC (10MC Swp)		3			
			57MC (10MC Swp)		2			

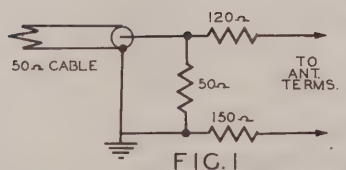


FIG. 1

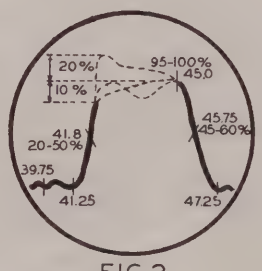


FIG. 2

ALIGNMENT INSTRUCTIONS (cont)

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4.5MC TRAP ALIGNMENT

Remove 6CB6 (V5) from its socket to prevent noise from masking the output indication.
Turn the contrast control fully clockwise.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.01MFD	High side to point (B) Low side to chassis.	4.5MC (Unmod)	Any	DC probe thru detector (Fig. 3). to pin 2 (grid) of picture tube. Common to chassis.	A12	Adjust for MINIMUM deflection. Attenuate generator input to not more than .2 Volt RMS.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
12.	.01MFD	High side to point (B) Low side to chassis.	4.5MC (Unmod)	Any	DC probe to point (C) Common to chassis.	A13, A14	Adjust for maximum deflection. Attenuate generator for not more than 5 Volts at VTVM.
13.	"	"	"	"	DC probe to point (D) Common to point (E)	A15	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	.01MFD	High side to point (B). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. to point (C). Low side to chassis.	A13, A14	Disconnect stabilizer capacitor C4. Adjust for curve of maximum amplitude and symmetry as in Fig. 4.
13.	"	"	"	"	"	Vert. Amp. to point (D). Low side to chassis.	A15	Reconnect capacitor C4. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 5. SLIGHTLY retouch A14 for maximum amplitude and straightness of crossover lines.

TUNER ALIGNMENT

The tuner portion of this receiver has been properly aligned at the factory and is very stable. Alignment of this portion should not be required in the field.

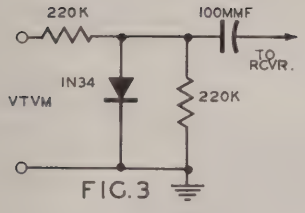


FIG. 3

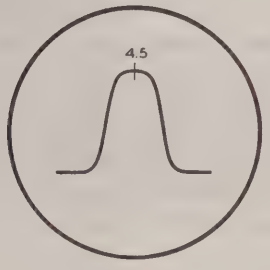


FIG. 4

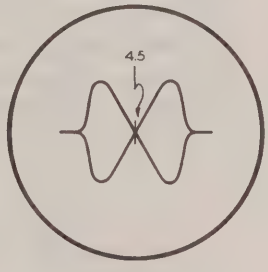
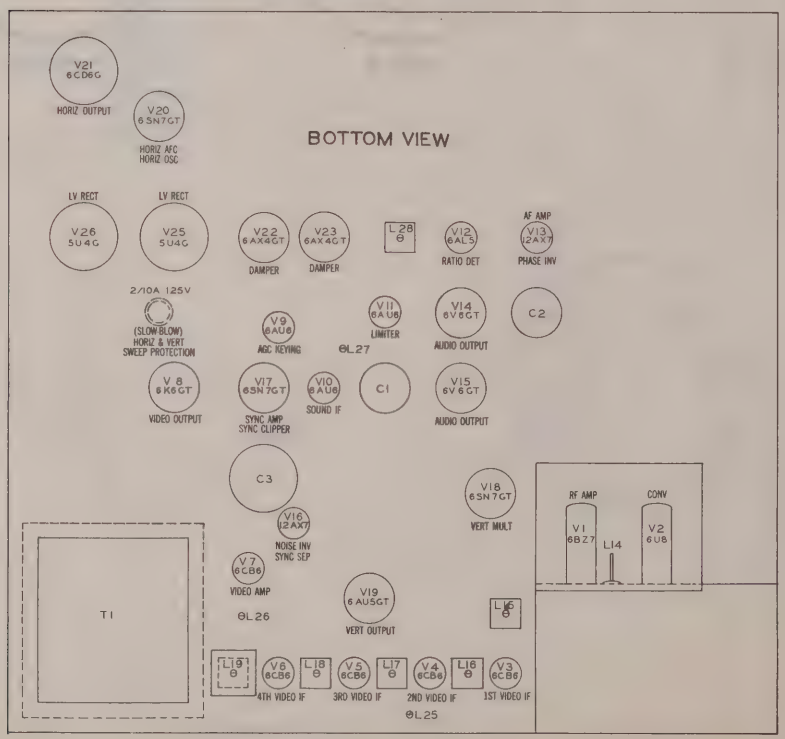


FIG. 5

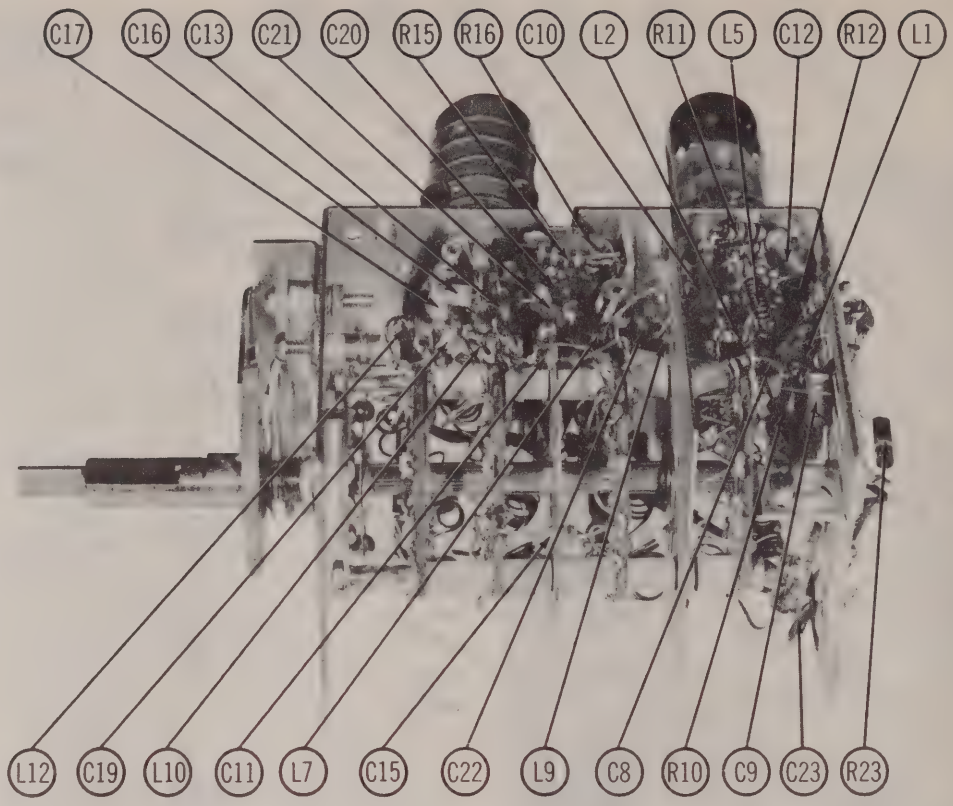
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BZ7	†1.9KΩ	†235KΩ	INF	0Ω	.1Ω	INF	1Meg	0Ω	0Ω
V 2	6U8	†7.7KΩ	363KΩ	†69KΩ	0Ω	.1Ω	†4.1KΩ	0Ω	0Ω	22KΩ
V 3	6CB6	100KΩ	47Ω	.1Ω	0Ω	■1KΩ	■1KΩ	0Ω		
V 4	6CB6	120KΩ	130KΩ	‡.1Ω	‡0Ω	†1.1KΩ	†1.1KΩ	130KΩ		
V 5	6CB6	100KΩ	47Ω	.1Ω	0Ω	†3KΩ	†17KΩ	0Ω		
V 6	6CB6	.1Ω	480Ω	.1Ω	0Ω	‡470Ω	†23KΩ	0Ω		
V 7	6CB6	3.9KΩ	0Ω	.1Ω	0Ω	†3KΩ	†9KΩ	0Ω		
V 8	6K6GT	0Ω	.1Ω	†4KΩ	†6.3KΩ	470KΩ	0Ω	0Ω	1KΩ	
V 9	6AU6	†21KΩ	†780Ω	‡.1Ω	‡0Ω	370KΩ	▲33KΩ	†780Ω		
V 10	6AU6	‡470KΩ	†0 Ω	‡0Ω	†.1Ω	†124Ω	†124Ω	‡ 82Ω		
V 11	6AU6	♦ 39KΩ	♦470Ω	.1Ω	0Ω	†4.1KΩ	†4.1KΩ	♦470Ω		
V 12	6AL5	INF	INF	0Ω	.1Ω	0Ω	0Ω	13.6KΩ		
V 13	12AX7	†230KΩ	500KΩ	2.2KΩ	0Ω	0Ω	†230KΩ	4.7KΩ	2.2KΩ	.1Ω
V 14	6V6GT	INF	.1Ω	†240Ω	†24Ω	225KΩ	5.2KΩ	0Ω	330Ω	
V 15	6V6GT	INF	0Ω	†240Ω	†24Ω	220KΩ	†11 KΩ	.1Ω	330Ω	
V 16	12AX7	†180KΩ	1.1Meg	3.9KΩ	.1Ω	.1Ω	♦22KΩ	4.7Meg	0Ω	0Ω
V 17	6SN7GT	♦1Meg	♦3.9KΩ	390Ω	♦0Ω	†57KΩ	♦22KΩ	.1Ω	0Ω	
V 18	6SN7GT	23KΩ	†100KΩ	400Ω	1.8Meg	▲3Meg	400Ω	.1Ω	0Ω	
V 19	6AU5GT	1.5Meg	.1Ω	400Ω	INF	†300Ω	INF	0Ω	†5.4KΩ	
V 20	6SN7GT	480KΩ	▲57KΩ	0Ω	1.5Meg	▲140KΩ	410KΩ	.1Ω	0Ω	
V 21	6CD6G	INF	0Ω	0Ω	▲60KΩ	1Meg	†490KΩ	.1Ω	†8.3KΩ	TOP CAP ▲14Ω
V 22	6AX4GT	INF	INF	200KΩ	INF	†135Ω	INF	0Ω	.1Ω	
V 23	6AX4GT	INF	INF	200KΩ	INF	†135Ω	INF	0Ω	.1Ω	
V 24	1B3GT		PINS	1 - 8	HAVE	INF	RESISTANCE			TOP CAP ▲464Ω
V 25	5U4G	INF	18KΩ	INF	100Ω	INF	75Ω	INF	18KΩ	
V 26	5U4G	INF	18KΩ	INF	100Ω	INF	75Ω	INF	18KΩ	
V 27	27EP4	‡0Ω	700K Ω	PIN 10 ▲10KΩ	PIN 11 190KΩ	PIN 12 ‡.1Ω				

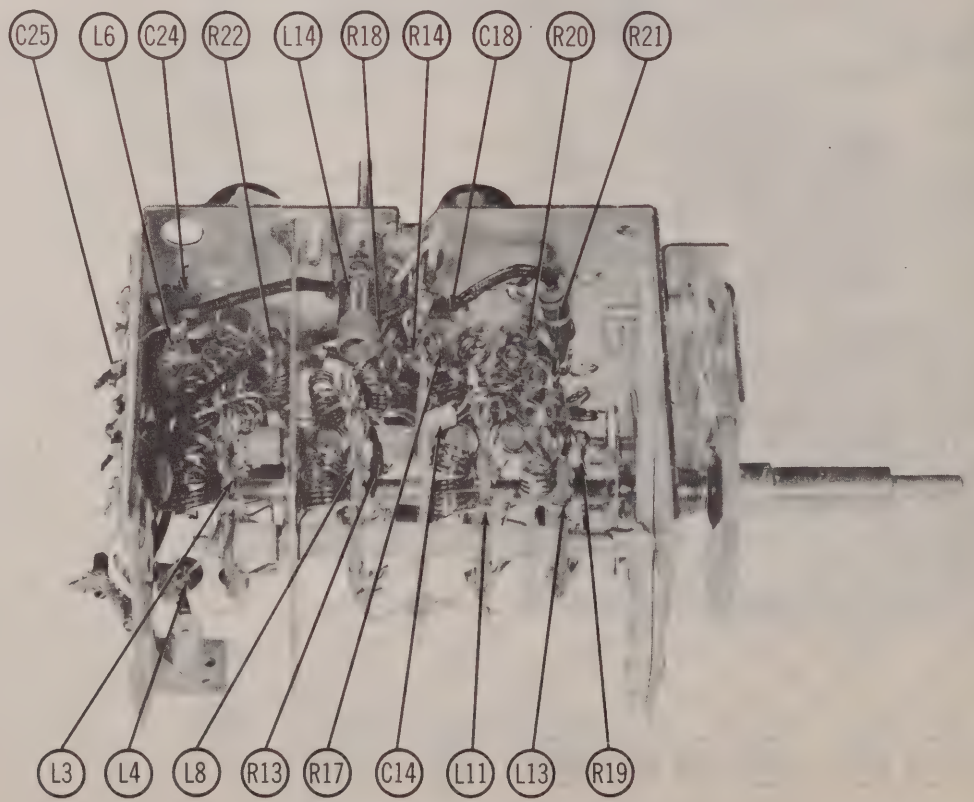
▲ MEASURED FROM PIN 3 OF V22
† MEASURED FROM PIN 2 OF V26
♦ MEASURED FROM 105 VOLT LINE
‡ MEASURED FROM 185 VOLT LINE
■ MEASURED FROM PIN 7 OF V4



TUBE PLACEMENT CHART

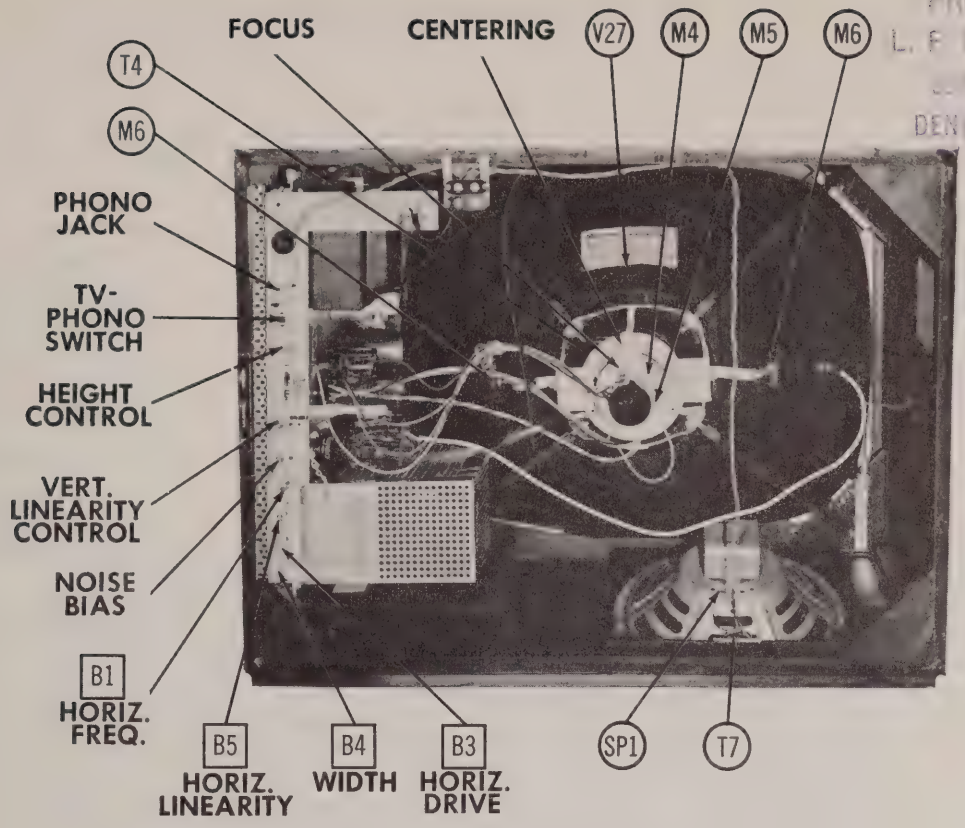


RF TUNER-RIGHT SIDE



RF TUNER-LEFT SIDE

PROPERTY OF
L. F. DUNNINGTON
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a weak TV signal, preferably a test pattern.

Set the noise bias control fully clockwise. Preset the horizontal drive trimmer (B3) $\frac{1}{2}$ turn from full clockwise position.

Short terminal "C" to terminal "D" of the horizontal oscillator coil L29.

Turn the horizontal hold control fully clockwise.

Adjust the horizontal frequency slug (B1) until the picture synchronizes horizontally.

Adjust the horizontal drive trimmer (B3) counter clockwise as far as possible without vertical white lines or compression of the center of the picture.

Adjust the horizontal linearity slug (B5) for a picture that is symmetrical from left to right. If two positions are found which appear correct use the furthest counter clockwise position.

Adjust the width slug (B4) for a picture slightly wider than necessary to fill the picture mask horizontally.

Remove the short from terminals C and D of L29 and connect the vertical amplifier of an oscilloscope through a 15MMF capacitor to terminal C.

Adjust the horizontal stabilizing slug (B2) so that the broad and narrow peaks appear of equal height on the scope as in Fig. 6. If necessary, keep the picture in sync by adjusting the horizontal hold.

Remove scope and turn horizontal hold fully clockwise. Turn the brightness control fully clockwise and adjust B1 until blanking bar appears at left of picture, then reverse the adjustment until blanking bar just moves off leaving the picture in sync

NOISE BIAS ADJUSTMENT

Place DC probe of VTVM on pin 2 (grid) of 12AX7 (V16). Place common lead on pin 3 (cathode). Adjust noise bias control for -11 volts at VTVM. View the picture and if necessary, make slight readjustment of the noise bias control for most stable sync.

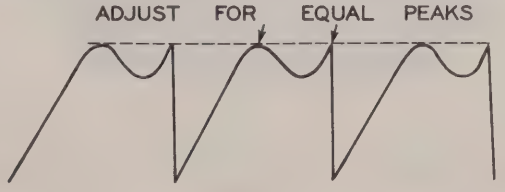


FIG. 6

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

See "Loss of High voltage".

INSUFFICIENT SWEEP

Check by substitution V20, V21, V22 and V23. Check waveform at W18.

If Satisfactory	If Unsatisfactory
Check C95, C1D, C96, C97, C98, T2 and other associated components.	Check C92, C93, C94, horizontal drive trimmer (B3) and other associated components.

DRIVE LINES

Check adjustment of horizontal drive trimmer (B3). Check by substitution V21, V22, V23 and V20. Check C97 and C98 for open.

COMPRESSED AT LEFT SIDE

Check by substitution V20, V21, V22 and V23. Check setting of horizontal linearity (B5) and width (B4). Check C95, C97, C98, T2 yoke and other associated components.

FOLDS

Substitute V20, V21, V22 and V23. Check C97 and C98. Check T2, yoke and other associated circuit components.

XMAS TREE EFFECT

Substitute V20. Check C91, C92, L29 and other associated circuit components.

VERTICAL

LOSS OF SWEEP

Check by substitution V18 and V19. Check waveform at W12.

If Satisfactory	If Unsatisfactory
Check C3C, R105, R106, T3, yoke and C81.	Check R123, C79, C80, R103, C78 and other associated components.

INSUFFICIENT SWEEP

Check by substitution V18 and V19. Check C3D. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Substitute V18 and V19. Check C3D, C80, T3, yoke and other associated components.

COMPRESSED AT TOP

Substitute V18 and V19. Check C80, T3, yoke and other components associated with the vertical output stage.

FOLDS

Check by substitution V18 and V19. Check R103 for change of value.

REDUCE SIZE FAST FREQUENCY

Check C78 for leakage.

FOLDED AND COMPRESSED TOP WITH INVERTED PICTURE – EXPANDED BOTTOM (Fig. 1)

Check C79 for open.

EXPANDED TOP COMPRESSED BOTTOM

Check C80 for leakage.

SYNC

HORIZONTAL

LOSS OF SYNC

Check by substitution V20. Check C87, C88, C84, C85, C86 and other components associated with V20.

CRITICAL SYNC

Check by substitution V20. Check C84, C85, C86, C87, C88, C89, C92 and other associated circuit components.

PULLING PICTURE

Check by substitution V20 and V21. Check C88 and C89 for leakage or change of value.

VERTICAL

LOSS OF SYNC

Check by substitution V7, V8, V16, V17 and V18. Check vertical integrator network, C77, C76 and other components associated with the vertical oscillator.

CRITICAL SYNC

Check by substitution V18, V17 and V16. Check adjustment of noise bias control. Substitute V7 and V8. Check vertical integrator network and other associated components.

TRIGGERING

Substitute V16, V17 and V18. Check circuit near these stages for filament lead dress.

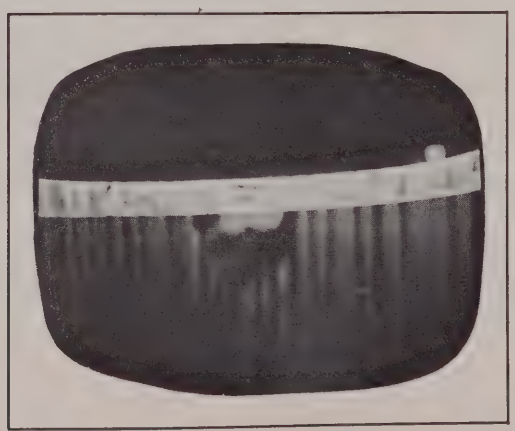
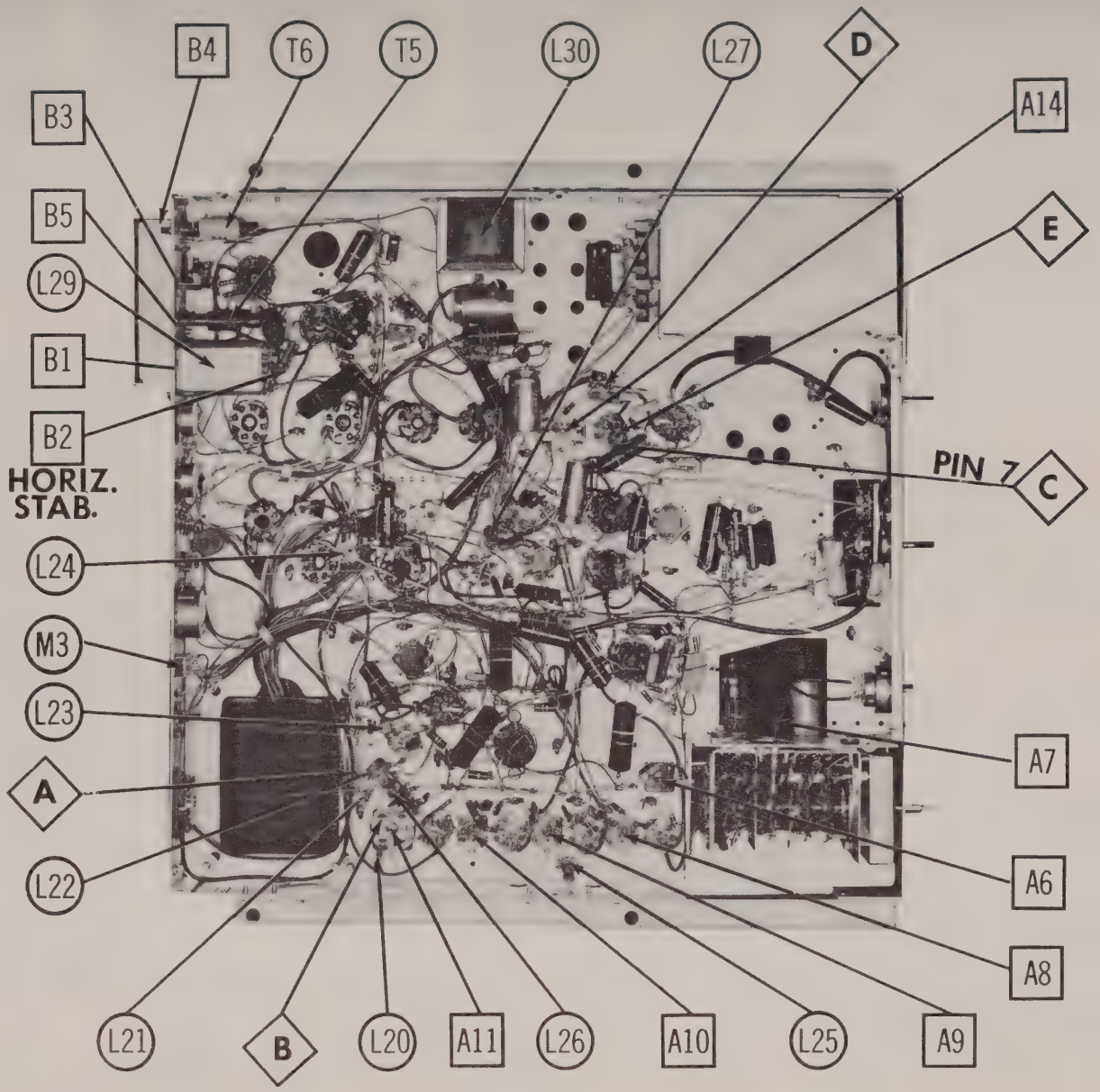


Fig.1 FOLDED AND COMPRESSED TOP WITH INVERTED PICTURE EXPANDED BOTTOM SEE VERTICAL SWEEP.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
L. F. DUNNAGAN
DENVER, COLORADO

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: Magnavox PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RTMA BASE TYPE	NOTES
V1A	RF Amplifier		6BZ7	9AJ	
B	RF Amplifier		6BQ7	9AJ	
V2	Converter		6U8	9AE	
V3	1st. Video IF Amp.		6CB6	7CM	
V4	2nd. Video IF Amp.		6CB6	7CM	
V5	3rd. Video IF Amp.		6CB6	7CM	
V6	4th. Video IF Amp.		6CB6	7CM	
V7	Video Amplifier		6CB6	7CM	
V8	Sound Output		6K6GT	7S	
V9	AGC Keying		6AU6	7BK	
V10	Sound IF Amp.		6AU6	7BK	
V11	Limiter		6AU6	7BK	
V12	Ratio Detector		6AL5	6BT	
V13	AF Amplifier-Phase Inverter		12AX7	9A	
V14	Audio Output		6V6GT	7S	
V15	Audio Output		6V6GT	7S	
V16	Noise Inverter-Sync Separator		12AX7	9A	
V17	Sync Amplifier-Sync Clipper		6SN7GT	8BD	
V18	Vert. Mult.		6SN7GT	8BD	
V19	Vert. Output		6AU5GT	8CK	
V20	Horiz. AFC-Horiz. Oscillator		6SN7GT	8BD	
V21	Horiz. Output		6CD6GT	8BT	
V22	Damper		6AX4GT	4CG	
V23	Damper		6AX4GT	4CG	
V24	HV Rectifier		1B3GT	3C	
V25	LV Rectifier		5U4G	5T	
V26	LV Rectifier		5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA: MAGNAVOX PART No.	REPLACEMENT DATA: SYLVANIA PART No	REPLACEMENT DATA: GENERAL ELECTRIC PART No	RTMA BASE TYPE	NOTES
V27	27EP4	27GP4	27EP4	12D	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Magnavox PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	▲40	350	270021-43	AFE4-93		DO92		FP428.4	TVL-4730	
B	▲35	350								
C	30	350								
D	▲30	350								
C2A	▲40	350	270021-49						TVL-4606	
B	▲5	350								
C	▲30	25								
C3A	▲5	350	270021-46						TVL-4726	
B	▲30	350								
C	▲10	350								
D	300	25								
C4	10	50	270027-4	PRS50/10		BR105			TC32	TVA-1304
C5	30	350	270027-30	PRS450/30		BR2035A			TC66	TVA-1608
C6	20	350	270027-20	PRS450/20		BR2035A			TC65	TVA-1608
C7	5	10	270027-21	PRS10/4		BR550			TC30	TVA-1203
C8	470			SI470	D6-471	TM5T5	GP2K-471	UC-5347		5GA-T47
C9	470			SI470	D6-471	TM5T5	GP2K-471	UC-5347		5GA-T47
C10	470			SI470	D6-471	TM5T5	GP2K-471	UC-5347		5GA-T47
C11	.1						NP0K-R1			
C12	470			SI470	D6-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C13	15						N330K-150			
C14	.68				TCZ-.68		NP0K-R68			
C15	.68				TCZ-.68		NP0K-R68			
C16	3.3			SI3.3NP9	TCZ-3.3		NP0K-3R3		ZT-5533	5TCCB-V33
C17	15			SI15N750	TCH-15		N750K-150			5TCU-Q15
C18	470			SI470	D6-471	TM5T5	GP2K-471	UC-5347		5GA-T47
C19	20									
C20	470			SI470	D6-471	TM5T5	GP2K-471	Uc-5347		5GA-T47
C21	470			SI470	D6-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C22	470			SI470	D6-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C23	1500			BPD-0015	DD-152	TM5D15	801-0015	DC-5215	5HK-D15	
C24	470			SI470	D6-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C25	82			SI82	D6-820		GP1K-820		UC-5347	5GA-Q82
C26	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C27	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C28	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C29	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C30	1.0		250306-114		TCZ-1		NP0K-010			5TCCB-V1
C31	27									
C32	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347		5GA-T47
C33	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347		5GA-T47
C34	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347		5GA-T47
C35	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C36	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C37	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C38	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C39	680		250218-4	BPD-00068	D6-681		GP2K-681	UC-5368	5GA-T68	
C40	680		250218-4	BPD-00068	D6-681		GP2K-681	UC-5368	5GA-T68	
C41	680		250218-4	BPD-00068	D6-681		GP2K-681	UC-5368	5GA-T68	
C42	470		250175-9	BPD-00047	DD-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C43	100		250207-46	SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C44	.1	400	250211-13	P488-1	DF-104	PTK4P1		PT601	4TM-P1	
C45	20000		250175-7	BPD-02	DD-203	PTK6S2		PT612	6HK-S2	
C46	.22	400	250202-15	P488-22		PTK4P22		PT4025	4TM-P22	
C47	.01	600	250201-7	P688-01	D6-103	PTK6S1	GP2-333-103	PT601	6TM-S1	
C48	.047	200	250202-11	P284-047	DF-503	PT285		PT4147	2TM-S47	
C49	.1	200	250202-13	P288-1	DF-104	PT2P1		PT401	2TM-P1	
C50	.22	400	250202-15	P488-22		PTK4P22		PT4025	4TM-P22	
C51	.01	600	250201-7	P688-01	D6-103	PTK6S1	GP2-333-103	PT601	6TM-S1	

PARTS LIST AND DESCRIPTIONS (cont)

CAPACITORS (cont)

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: Magnavox PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C52	10		250207-3	SM10NP0	TCZ-10			NP0K-100	ZT-541	5TCC-Q1
C53	10000		250175-2	BPD-01	DD-1032	TM5S1		81-01	DC-511	5HK-S1
C54	68	500	250159-80							
C55	5000		250175-1	BPD-005	MD-502	TM5D5	81-005		DC-525	5HK-D5
C56	5000		250175-1	BPD-005	MD-502	TM5D5	81-005		DC-525	5HK-D5
C57	5000		250175-1	BPD-005	MD-502	TM5D5	81-005		DC-525	5HK-D5
C58	5000		250175-1	BPD-005	MD-502	TM5D5	81-005		DC-525	5HK-D5
C59	56	500	250159-79							
C60	5000		250175-1	BPD-005	MD-502	TM5D5	81-005		DC-525	5HK-D5
C61	5000		250175-1	BPD-005	MD-502	TM5D5	81-005		DC-525	5HK-D5
C62	470	500	250159-90	1469-0005		SR6T5			MCB345	MS-35
C63	1000		250068-46	SM1000	D6-102	TM5D1	GP2L-102		UC-531	5HK-D1
C64	.01	600	250201-7	P688-01	D6-103	PTK6S1	GP2-333-103		PT601	6TM-S1
C65	.0033	600	250201-6	P688-0033	D6-332	PTK6D33	GP2-333-332		PT6233	6TM-D3
C66	470	500	250159-90	1469-0005		SR6T5			MCB345	MS-35
C67	.047	600	250201-11	P688-047	DF-503	PTK6S47			PT6147	6TM-S47
C68	.047	600	250201-11	P688-047	DF-503	PTK6S47			PT6147	6TM-S47
C69	.0015	600	250201-2	P688-0015	D6-152	PTK6D15	GP2L-152		UC-5215	6TM-D15
C70	.0015	600	250201-2	P688-0015	D6-152	PTK6D15	GP2L-152		UC-5215	6TM-D15
C71	240	500	250159-56							
C72	.22	400	250202-15	P488-22		PTK4P22			PT4025	4TM-P22
C73	1500		250175-3	BPD-0015	DD-152	TM5D15	801-0015		DC-5215	5HK-D15
C74	10000		250175-2	BPD-01	DD-1032	TM5S1	81-01		DC-511	5HK-S1
C75A	.002			P688-002		PTK6D2			PT622	
B	.005		▲350186-1	P688-005	▲PC-100	PTK6D5	▲1405-01		PT625	▲101C1
C	.005			P688-005		PTK6D5			PT625	
C76	.0047	600	250201-5	P688-0047	P6-472	PTK6D47	GP2-333-472		PT6247	5TM-D47
C77	.0047	600	250201-5	P688-0047	D6-472	PTK6D47	GP2-333-472		PT6247	6TM-D47
C78	2700	500	250160-48							
C79	1000	600	250201-11	P688-047	DF-503	PTK6S47			PT6147	6TM-S47
C80	.1	600	250201-13	P688-1	DF-104	PTK6P1			PT601	6TM-P1
C81	.047	600	250201-11	P688-047	DF-503	PTK6S47			PT6147	6TM-S47
C82	.0033	600	250201-6	P688-0033	D6-332	PTK6D33	GP2-333-332		PT6233	6TM-D3
C83	.01	600	250201-7	P688-01	D6-103	PTK6S1	GP2-333-103		PT601	6TM-S1
C84	47	500	250159-78	1469-00005		SR5Q5			MCB225	MS-45
C85	82	500	250159-81							
C86	68	500	250159-80	1469-00007		SR6Q7				MS-47
C87	.047	600	250201-11	P688-047	DF-503	PTK6S47			PT6147	6TM-S47
C88	.47	200	250202-17	P288-47		PT2P5			PT405	2TM-P47
C89	.022	300	250202-9	P488-022	DD-203	PTK4S2			PT4122	4TM-S22
C90	.047	600	250202-11	P688-047	DF-503	PTK6S47			PT6147	6TM-S47
C91	180	500	250159-51							
C92	10000	500	250161-47						MCB475	
C93	680	500	250159-131	1479-0007		2R5T7				MS-37
C94	470	500	250159-90	1469-0005		SR6T5			MCB345	MS-35
C95	.047	600	250201-11	P688-047	DF-503	PTK6S47			PT6147	6TM-S47
C96	.0068	600	250201-6	P688-0068		PTK6D68				6TM-D68
C97	.033	600	250201-10	P688-033		PTK6S3			PT6133	6TM-S3
C98	.047	600	250201-11	P688-047		PTK6S47			PT6147	6TM-S47
C99	500	30000	250189-3							
C100	82	2000							20GA-Q82	
C101A	10000		250217-3	BPD-2X01	DD3-103	TM5D31	81-01		DC-511	5HK-231
B	10000						81-01		DC-511	

Note 1. Not used in all Models.
Note 2. Some Models use 47MMF in this application.
* Items C75A, C75B, C75C, R95A, R95B, R95C are combined in one unit.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: MAGNAVOX PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	2000Ω	2	D220128-30	WK-2000	A438-2000	V-131	R2500L	Contrast-Wire Wound
B	Shaft		Not Req.	Nof Req.	FS-3	Not Req.	DS-36	Attach to R1A
C	Switch		Not Req.	SI	Not Req.	K-10	US-30	Attach to R1A
R2A	500KΩ	½	D220128-28	QI3-133	AG-60-Z	B-60	U-48	Tone
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R2A
R3A	1 Meg	½	D220126-32	QII-137	AG-61-S*	B-69*	U-54	Vert. Hold
B	Shaft		Not Req.	VQ	FS-3	Not Req.	Not Req.	Attach to R3A
R4A	100KΩ	½	D220126-31	QII-128	AG-49-S*	B-60*	U-41	Brightness
B	Shaft		Not Req.	VQ	FS-3	Not Req.	DM-37	Attach to R4A
R5A	50KΩ	½	D220126-33	QII-123	AG-44-S*	B-31*	U-35	Horiz. Hold
B	Shaft		Not Req.	VQ	FS-3	Not Req.	Not Req.	Attach to R5A
R6A	1 Meg	½	D220126-25	QI3-137	AG-63-Z	B-70	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R6A
R7A	400Ω	2	D220128-34	W-400	A43-400	VK-126	R500L	Height-Wire Wound
B	Shaft		Not Req.	Not Req.	FKS-1/4	Not Req.	Not Req.	Attach to R7A
R8A	2.5Meg	½	D220076-5	QII-239	AG-84-S	AB-83	SU-565	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A
R9A	500KΩ	½	D220126-35	QII-133	AG-59-S	AB-59	SU-50	Noise Bias
B	Shaft		Not Req.	RQ	FKS-1/4	AK-1	Not Req.	Attach to R9A

* File shafts to duplicate original.

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MAGNAVOX PART No	IRC PART No.	NOTES
R10	22KΩ	½			
R11	470KΩ	½			
R12	470KΩ	½			
R13	68000Ω	½			
R14	1000Ω	½		BTS-1000	
R15	33KΩ	½			
R16	330KΩ	½			
R17	68KΩ	½			
R18	3300Ω	½		BTS-3300	
R19	22KΩ	½			
R20	22KΩ	½			
R21	6800Ω	1			
R22	150Ω	½		BTS-150	
R23	10KΩ	½		BTS-10K	
R24	1000Ω	½	250104-62	BTS-1000	
R25	6800Ω	½	250104-73		
R26	47Ω	½	250104-66	BTS-47	
R27	1000Ω	½	250104-62	BTS-1000	

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MAGNAVOX PART No.	IRC PART No.	NOTES
R28	10KΩ	½	250104-74	BTS-10K	
R29	330KΩ	½	250104-92		
R30	180KΩ-5%	½	250104-89		
R31	10KΩ	½	250104-74	BTS-10K	
R32	47Ω	½	250104-46	BTS-47	
R33	1000Ω	½	250104-62	BTS-1000	
R34	15KΩ	½	250104-76		
R35	1000Ω	½	250104-62	BTS-1000	
R36	47Ω	½	250104-46	BTS-47	
R37	1MΩ	½	250104-77		
R38	2200Ω	1	250105-66	BTA-2200	
R39	56KΩ	½	250104-83	BTS-56K	
R40	3900Ω	½	250104-69	BTS-3900	
R41	180Ω	½	250104-53	BTS-180	
R42	22KΩ	½	250104-78	BTS-22K	
R43	470Ω	½	250104-58	BTS-470	
R44	3900Ω	½	250104-69	BTS-3900	
R45	22KΩ	1	250105-78	BTA-22K	

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MAGNAVOX PART No.	IRC PART No.	NOTES
R46	3300Ω	½	250104-68	BTS-3300	
R47	2200Ω	1	250105-66	BTA-2200	
R48	180KΩ	½	250104-89	BTS-180K	
R49	18KΩ	½	250104-77	BTS-18K	
R50	470KΩ	½	250104-94	BTS-470K	
R51	5600Ω	3	250106-71	BTB-5600	
R52	33000Ω	10	240021-31		
R53	2.2Meg	½	250104-102	BTS-2.2Meg	
R54	1 Meg	½	250104-98	BTS-1 Meg	
R55	150KΩ	½	250104-88	BTS-150K	
R56	68KΩ	½	250104-84	BTS-68K	
R57	47KΩ	½	250104-82	BTS-47K	
R58	33KΩ	½	250104-80	BTS-33K	
R59	8.2Meg	½	250104-109	BTS-8.2Meg	
R60	680KΩ	½	250104-96	BTS-680K	
R61	39KΩ	½	250104-81	BTS-39K	
R62	270KΩ	½	250104-91	BTS-270K	
R63	100KΩ	½	250104-86	BTS-100K	
R64	470KΩ	½	250104-94		
R65	82Ω	½	250104-49	BTS-82	
R66	100Ω	½	250104-50	BTS-100	
R67	39KΩ	½	250104-81		
R68	470Ω	½	250104-58	BTS-470	
R69	27KΩ	½	250104-79	BTS-27K	
R70	3300Ω	½	250104-68	BTS-3300	
R71	220Ω-5%	½	250104-54	BTS-220-5%	
R72	68KΩ	½	250104-84	BTS-68K	
R73	8200Ω	½	250104-73	BTS-8200	
R74	6800Ω	½	250104-72	BTS-6800	
R75	1 Meg	½	250104-98	Rs S-1 Meg	
R76	3300Ω	½	250104-85	BTS-3300	
R77	150KΩ	½	250104-88	BTS-150K	
R78	150KΩ	½	250104-88	BTS-150K	
R79	4700Ω	½	250104-70	BTS-4700	
R80	220KΩ	½	250104- 90	BTS-220K	
R81	330Ω	2	250106-56	BTB-330	
R82	220KΩ	½	250104-90	BTS-220K	
R83	10KΩ	½	250105-74	BTA-10K	
R84	10KΩ	1	250105-74	BTA-10K	
R85	68KΩ	½	250104-84	BTS-68K	
R86	680KΩ	½	250104-98	BTS-680K	
R87	270KΩ	½	250104-91	BTS-270K	
R88	4.7Meg	½	250104-106	BTS-4.7Meg	
R89	470KΩ	½	250104-94	BTS-470K	

RESISTORS (cont)

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: MAGNAVOX PART No.	IRC PART No.	NOTES
R90	22KΩ	½	250104-78	BTS-22K	
R91	56KΩ	½	250104-83	BTS-56K	
R92	1 Meg	½	250104-98	BTS-1 Meg	
R93	39ΩΩ	½	250104-57	BTS-39Ω	
R94	3900Ω	½	250104-69	BTS-3900	
R95A	22KΩ	½		BTS-22K	
B	8200Ω	½	▲250186-1	BTS-8200	
C	3300Ω	½		BTS-3300	
R96	6200Ω	½	250104-73	BTS-8200	
R97	22KΩ	½	250104-78	BTS-22K	
R98	100KΩ	1	250105-86	BTA-100K	
R99	1.5Meg	½	250104-100	BTS-1.5Meg	
R100	2.2Meg	½	250104-102	BTS-2.2Meg	
R101	2.2Meg	½	250104-102	BTS-2.2Meg	
R102	1000Ω	½	250104-62	BTS-1000	
R103	1.5Meg	½	250104-100	BTS-1.5Meg	
R104	150Ω	1	250105-52	BTA-150	
R105	4700Ω	1	250105-70	BTA-4700	
R106	15KΩ	1	250105-76	BTS-15K	
R107	560Ω	½		BTS-560	
R108	560Ω	½		BTS-560	
R109	39ΩΩ	½		BTS-390	Note 1
R110	8200Ω	½	250104-73	BTS-8200	Note 2
R111	120KΩ	½	250104-87	BTS-120K	
R112	120KΩ	½	250104-87	BTS-120K	
R113	330KΩ	½	250104-92	BTS-330K	
R114	820KΩ	½	250104-97	BTS-820K	
R115	82KΩ	½	250104-85	BTS-82K	
R116	330KΩ	½	250104-92	BTS-330K	
R117	3900Ω	½	250104-69	BTS-3900	
R118	150KΩ	½	250104-88	BTS-150K	
R119	150KΩ	½	250104-88	BTS-150K	
R120	8200Ω	½	250104-73	BTS-8200	
R121	47KΩ	1	250105-82	BTA-47K	
R122	100Ω	½	250104-50		
R123	10KΩ	1	250105-74	BTA-10K	
R124	8200Ω	2	250106-73	BTB-8200	
R125	15KΩ	1	250105-76	BTA-15K	Note 3
R126	2.7Ω	1	250107-3		
R127	1 Meg	1	250105-98		
R128	105Ω	15	240031-34	ZD-100	
R129	650Ω	10	240021-33		
R130	82KΩ	½	250104-85	BTS-82K	
R131	270KΩ	½	250104-91	BTS-270K	Note 3

Note 1. This resistor omitted when R110 is used.
Note 2. Not used in early production models.
Note 3. Not used in all models.
* Items R95A, R95B, R95C, C75A, C75B, C75C are combined in one unit.

TRANSFORMER (POWER)

ITEM No.	RATING: PRI.	RATING: SEC. 1	RATING: SEC. 2	RATING: SEC. 3	REPLACEMENT DATA: MAGNAVOX PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	RCA TYPE No.
T1	117VAC	604VCT	5 VAC	6.3VAC	300068-1			IP-281		
	② 2.66A	.350ADC	③ 6A	④ 1.4A						
				REC 4						
				12.6VCT ④ 5.2A						

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING: DC RESISTANCE PRI.	RATING: DC RESISTANCE SEC.	REPLACEMENT DATA: MAGNAVOX PART No.	STANCOR PART No.	MERIT PART No	CHICAGO PART No.	TRIAD PART No.	RCA TYPE No.	NOTES
T2	484ΩTap ② 14Ω	35Ω Tap ③ 4Ω, 17Ω REC 2 0Ω	360552-2A ②⑤ 360552-3 ① 360553-1 ②						Horiz. Output Trans.
T3	175Ω	14Ω	330035-1			TSO-15			Vert. Output Trans.
T4A	34Ω		360556-3		MDF-73				Horiz. Deflection Coils
B	43Ω		360556-3 ③						Vert. Deflection Coils
T5	13Ω		360553-1		MWC-8		WC-12 ④	213R1	Horiz. Linearity Coil
T6	10Ω	54Ω	360534-1	WC-5 ⑤	MWC-1⑤		WC-11 ⑤		Width & AGC Coil

① Alternate horiz. output trans.
② Alternate horiz. output trans. used with yoke 360556-1.
③ Alternate deflection yoke.
④ Connect to coded blue & red terminals.
⑤ Enlarge mounting hole.
⑥ Includes horiz. centering control.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: MAGNAVOX PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	NOTES
T7	7.35Ω CT	3.1Ω	486Ω CT	.26Ω		A-3850 ①	A-2936 ①	RO-301 ①	S-51X ①	① Drill one new mtg. hole.

SPEAKER

RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: MAGNAVOX PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1 12"	PM	3.1Ω	580032	12J11	12A4A	

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA Magnavox PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Trans.	0ΩCT	0Ω					
L2	Ant. Coil	0Ω						Channel 13
L3	Ant. Coils	0Ω						
L4	IF Trap	3Ω						3.3 Microhenries, (IRC part #CLA)
L5	Neutr. Coil	0Ω						
L6	Fil. Choke	.22Ω						.47 Microhenry (IRC part #CLA)
L7	RF Coil	0Ω						Channel 13
L8	RF Coils	0Ω						
L9	Fil. Choke	.22Ω						.47 Microhenry (IRC part #CLA)
L10	Mixer Grid Coil	0Ω						Channel 13
L11	Mixer Grid Coils	0Ω						Channel 13
L12	Osc. Coil	0Ω						
L13	Osc. Coils	0Ω						
L14	Conv. Plate	0Ω						
L15	1st. Video IF	.2Ω		360545-1	17-4503			Includes trap
L16	2nd. Video IF	.1Ω	.1Ω	360546-1			6233 ‡	Includes trap
L17	3rd. Video IF	.1Ω	.1Ω	360546-1			6232 ‡	Includes trap
L18	4th. Video IF	.1Ω	.1Ω	360546-1				Includes trap
L19	5th. Video IF	.1Ω	.1Ω	360549-1				Includes 1N64 Crystal detector, 5MMF Cap. & 6 Microhenries Series Peaking Coil
L20	RF Choke	1.5Ω		360443-23			4610	6 Microhenries
L21	Series Peaking Coil	4.4Ω		360443-24	19-3093 †	TV-181 †	4642 †	103 Microhenries, wound on 22KΩ resistor
L22	Shunt Peaking Coil	9.5Ω		360443-19	19-3300		4648	360 Microhenries
L23	Shunt Peaking Coil	4.4Ω		360443-25	19-3093 ■	TV-181 ■	6177 ■	93 Microhenries, wound on 6.8KΩ resistor
L24	Series Peaking Coil	6.5Ω		360443-26	19-3180 ▲	TV-184	6180 ▲	180 Microhenries, wound on 12KΩ resistor
L25	Assoc. Sound Trap	0Ω		360554-1				
L26	1st. Sound IF	3.7Ω		360535-1	17-3402 *		1470	Tapped ⓐ 3Ω
L27	2nd. Sound IF	1Ω		360481-1	17-3400	TV-151	1470	
L28	Ratio Det.	3.6Ω	.35Ω CT	360482-1	17-1033	TV-110	1468	Tertiary winding -.83Ω
L29	Horiz. Osc.	65Ω		360499-4	20-1402	TV-162	6183	Pri. tapped ⓐ 41Ω, horiz. waveform winding-54Ω

* Disconnect capacitor in parallel.
† Parallel with 22KΩ resistor
‡ Use adaptor plate
■ Parallel with 6.8KΩ resistor
▲ Parallel with 12KΩ resistor

FILTER CHOKE

ITEM No.	RATINGS TOTAL DIRECT CURRENT	RATINGS D. C. RESISTANCE	RATINGS INDUCTANCE (0 CURRENT 1000 ∿)	REPLACEMENT DATA Magnavox PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
L30	.320ADC	24.4Ω	.8 Hy.	B-320064	C-2328 ①		TR-1325	

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA MAGNAVOX PART No. FUSE	MAGNAVOX PART No. HOLDER	LITTELFUSE PART No. FUSE	LITTELFUSE PART No. HOLDER	BUSS PART No. FUSE	BUSS PART No. HOLDER
M1	3AG (Slo-Blo)	2/10A ⓐ125V	180530-1		313.200 (3AG-2/10A-Slo-Blo)	155020	MDL-2/10	HDJ-A

MISCELLANEOUS

ITEM No.	PART NAME	MAGNAVOX PART No.	NOTES
M2	RF Tuner	700379-21	
M3	Switch	1620229-1	TV Phono Selector
M4	Focus Assembly		Includes centering device
M5A	Ion Trap	360492-2	
B	Ion Trap	360492-4	
M6	Correction Magnet	360557-1	
B3	Trimmer Capacitor	260116-1	110-560MMF Horizontal Drive

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

VIDEO

LOSS OF VIDEO

Substitute V7 and V8. Check waveform at W2.

If Satisfactory	If Unsatisfactory
Check C45, R52, R51, L24, picture tube and other associated components.	Check C44, L23, R47, R45, R46 and other associated circuit components.

SOUND BARS

Check adjustment of Local Oscillator. Check 4.5MC Trap (A12).

POOR RESOLUTION

Check by substitution V1, V2, V3, V4, V5, V6 and V10. Check C43 and C3A. Check bypass capacitors associated with the Video IF strip. Check Video IF Alignment.

POOR CONTRAST

Substitute V7 and V8. Check picture tube and other associated circuit components.

SMEAR

Substitute V7 and V8. Check L23 and L24 for open. Check C44 and C45 for leaky. Check R45, R46, R47, R51 and R52 for change of value. Check picture tube and other associated components.

ONE WIDE BLACK BAR ACROSS PICTURE

Check tuner, Video IF, Video Amplifier and output tubes for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V10, V11, V12, V13, V14 and V15. Check stages of V13, V14 and V15 using audio signal generator.

If Satisfactory	If Unsatisfactory
Check alignment and components of the audio IF and ratio detector stages.	Check components associated with these stages.

BUZZ

Readjust ratio detector transformer (A14) and A15). If buzz is still objectionable substitute V12 and readjust (A14) and (A15). If buzz persists check C4, C2b, C1b and C2c for leakage.

DISTORTED

Check by substitution V10, V11, V12, V13, V14 and V15. Check stages of V13, V14 and V15 using audio signal generator.

If Distorted	If Undistorted
Check components associated with V13, V14 and V15 especially C67, C68, T7 and speaker.	Check audio IF and Ratio Detector alignment. Check associated circuit components.

POWER

SMALL RASTER WEAK SOUND

Substitute V25 and V26 simultaneously. Check B+ filter network for leaky or shorted filter capacitors.

DIM PICTURE POOR FOCUS

Check by substitution V25 and V26. Check B+ filter network. Check picture tube.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check fuse M1. Check by substitution V20, V21, V22, V23 and V24. Check waveform at W18.

If Satisfactory	If Unsatisfactory
Check C99, R127, R126, T2, yoke and other associated circuit components.	Check C92, C93, C94, C91, L29, horizontal drive trimmer and other associated components.

INSUFFICIENT HIGH VOLTAGE

Substitute V20, V21, V22, V23, V24, V25 and V26. Check picture tube. Proceed as outlined under "LOSS OF HIGH VOLTAGE".

BLOOMING

Check by substitution V24, V23, V22, V21 and V20. Check picture tube.

GENERAL

RASTER NO SOUND NO PICTURE

Check by substitution V1, V2, V3, V4, V5, V6 and V10. Check components associated with video IF strip also 1st. Sound IF stage. V10 and V6 are in series from B+. Should one tube fail both sound and picture loss would result.

RASTER SOUND NO PICTURE

See "LOSS OF VIDEO".

INTERMITTANT STREAKS

Check high voltage section for corona discharge and arcing. Excessive dirt near the picture tube anode connector can cause this trouble.

TOTAL LOSS OF SYNC

Check by substitution V16 and V17. Check setting of noise bias control. Substitute V9. Check signal at W1 for signal overload and sync clipping

POOR FOCUS

Check adjustment on focalizer unit. Check potentials applied to picture tube. If Satisfactory check picture tube.

DEAD SET

Check AC interlock assembly. Check jumper on speaker socket. Check T1.

The Trouble-Shooting photographs shown are made with permission of transmitting station WFBM-TV and in no way reflect the quality of the transmitted picture. Similarly, symptoms shown are assumed and are not indicative of the quality and workmanship of this receiving equipment.

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

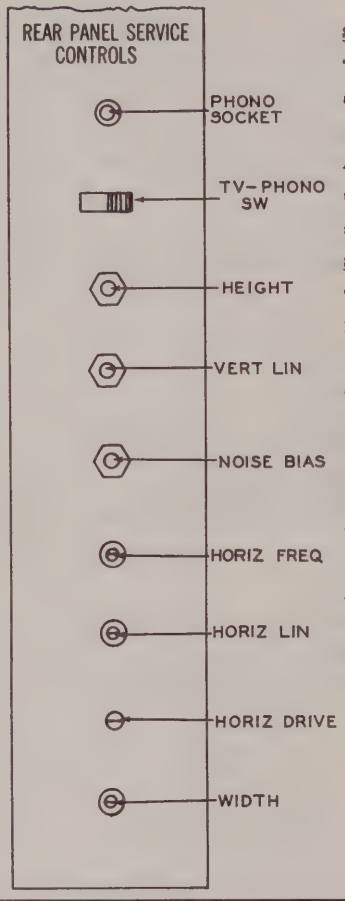
Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by removing the channel selector and fine tuning knobs.

PICTURE SAFETY GLASS CLEANING

To clean safety glass remove two metal screws holding metal strip at the right side of safety glass. Remove metal strip at the right side of safety glass and two metal strips at top and bottom (Metal strip at right holds in place strips at top and bottom). Slide safety glass to the right and remove. Reverse this procedure when installing safety glass. Use extreme caution when removing or installing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).



SPECIAL ADJUSTMENTS - NOISE BIAS CONTROL

The Noise Bias Control should not be adjusted in the field, for proper adjustment see Horiz. Sweep Circuit Adjustments on page 11.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency slug (L29) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF Detector buzz, adjust the ratio detector secondary (L28) located on top of chassis. (See tube placement chart)

FUSES

One fuse is used for horizontal sweep circuit protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by means of a centering lever on the PM focusing assembly. Adjust the centering lever from side to side, and up and down until the picture is properly centered.

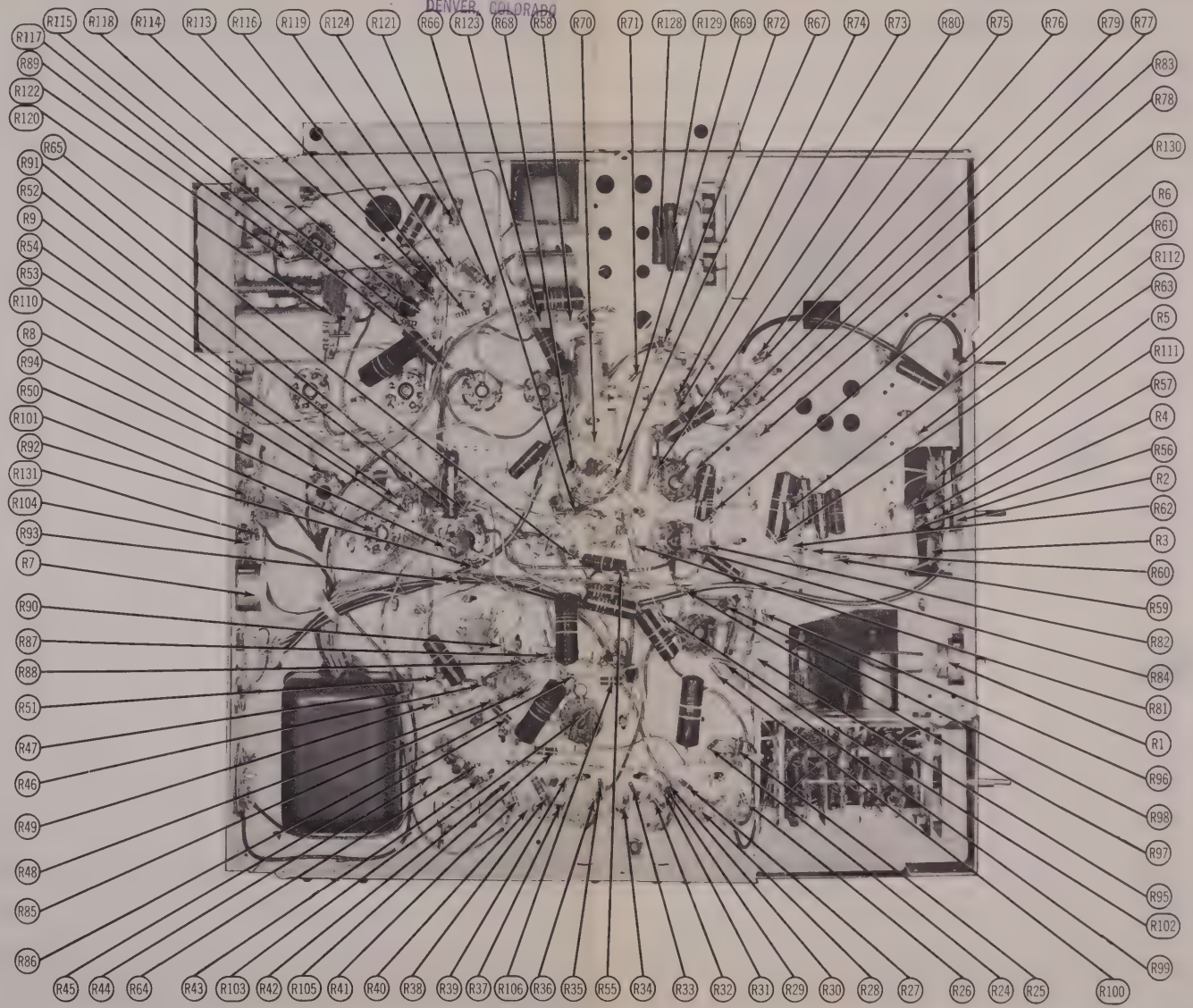
ANTI-PIN CUSHION CORRECTION

Reduce the picture size so that the sides of the raster are visible, and position the magnets so that all sides are straight lines and the corners are at right angles.

DISASSEMBLY INSTRUCTIONS

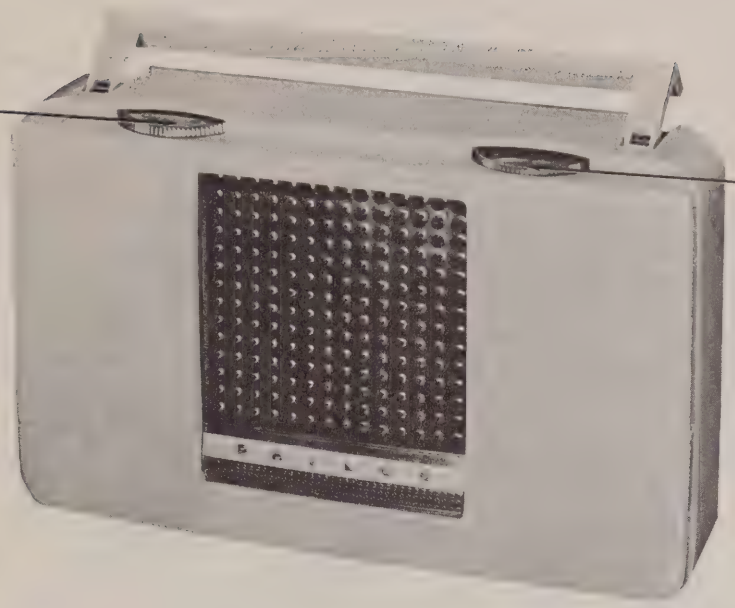
1. Remove 8 push on type control knobs from front panel.
2. Remove 10 wood screws and 1 metal screw. Remove rear cover.
3. Disconnect antenna lead to chassis, speaker plug, yoke plug, CRT socket, and HV lead.
4. Remove 4 chassis bolts. Remove chassis.
5. Remove 4 speaker nuts. Remove speaker.

L. F. D.
3924 MEADE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. BLANKENSHIP
3929 MEADE ST
DENVER, COLORADO



PHILCO
MODEL B650

TRADE NAME	Philco Model B650
MANUFACTURER	Philco Corp., Tioga & "C" Sts., Philadelphia, Pa.
TYPE SET	Battery Operated Portable AM Superheterodyne Receiver
TUBES (Four)	Types 1R5 Conv., 1U4 IF Amp., 1U5 Det.-AVC-AF Amp., 3V4 Audio Output
POWER SUPPLY	1.5 Volts "A" Supply & 75 Volts "B" Supply
RATING	200MA @ 1.5 Volts DC (230MA -Battery Saver "Off") & 6.5MA @ 75 Volts DC (8MA -Battery Saver "Off")
TUNING RANGE—BROADCAST	535-1620KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

With tuning gang fully closed, set low frequency index mark on the dial to coincide with index mark located on the chassis. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.1MFD	High side to pin 6 (grid) of 1R5 (V1). Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2, A3	Adjust for maximum deflection.
2.		Loop	1620KC	"	"	A4	"
3.		"	1400KC	Tune to 1400KC signal	"	A5	1400KC on the dial should coincide with index mark on the chassis. Adjust for maximum deflection.
4.		"	600KC	Tune to 600KC signal	"	A6	600KC on the dial should coincide with index mark on the chassis. Adjust for maximum deflection by moving coil SLIGHTLY to left or right on loop stick.
5.	Repeat steps 2, 3 and 4 for maximum deflection on output meter.						

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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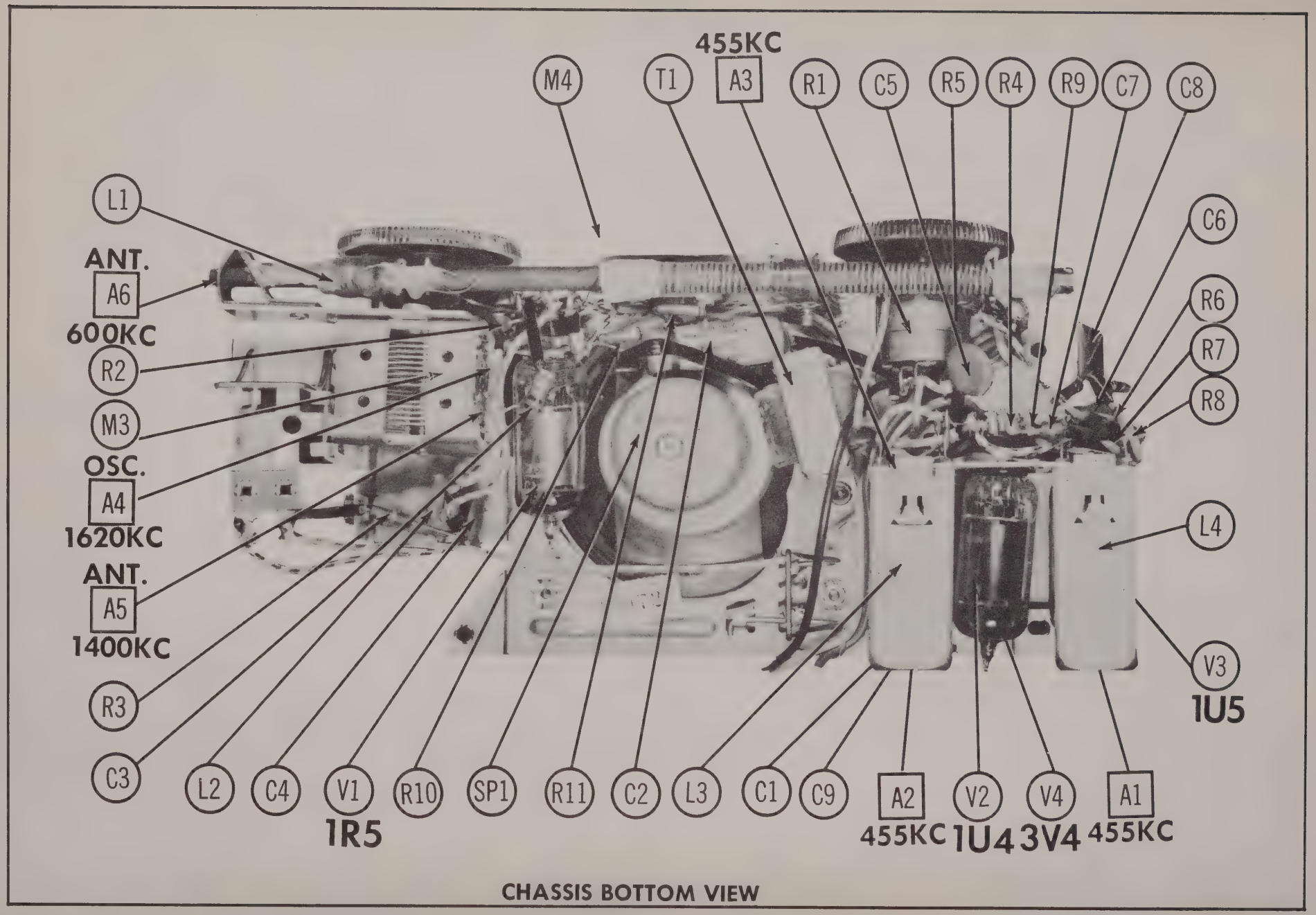

CHASSIS BOTTOM VIEW

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: PHILCO PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RTMA BASE TYPE	NOTES
V1	Converter	1R5	1R5	7AT	
V2	IF Amplifier	1U4	1U4	6AR	
V3	Det-AVC-AF Amp.	1U5	1U5	6BW	
V4	Audio Output	3V4	3V4	6BX	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING: CAP.	RATING: VOLT	REPLACEMENT DATA: PHILCO PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1	10	80	30-2417-32			BBR10-90				
C2	.05	200		P288-05	DF-503	PTE4S5		PT415	2TM-S5	Note 1
C3	47		62-04700901	SI47	D6-470		GP1K-470		5GA-Q47	
C4	5000		30-1238-1	BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C5	5000		30-1238-1	BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C6	8		30-1224-46							
C7	3.3		30-1221							
C8A	10000				DD-102		801-001	DC-521	5HK-D1	
B	10000				DD-1032		811-01	DC-511	5HK-S1	
C	220		30-1237	PA-108	D6-221		GP2K-221	UC-5322	5GA-T22	
D	2000				DD-202		801-002	DC-522	5HK-D2	
C9	.004	600	30-4650-56	P688-004	D6-402	PTE6D4	GP2-333-402	PT624	6TM-D4	

Note 1. Some Models may use an .03MFD @ 200V in this application.

CONTROLS

ITEM No.	RATING: RESISTANCE	RATING: WATTS	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	33-5566-50	Q13-137	AG-63-Z	B-70-S	U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-2	SWB-2	Not Req.	US-27	Attach to R1A

RESISTORS

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	NOTES
R2	100KΩ	1/10 1/5 1/2 1 2	66-4108340	BTS-100K	
R3	15KΩ		66-3158340	BTS-15K	
R4	3.3Meg		66-5338340	BTS-3.3Meg	
R5	3.3Meg		66-5338340	BTS-3.3Meg	
R6	10Meg		66-6108340	BTS-10Meg	

ITEM No.	RATING: OHMS	RATING: WATT	REPLACEMENT DATA: PHILCO PART No.	IRC PART No.	NOTES
R7	4.7Meg	1/10 1/5 1/2 1 2	66-5478340	BTS-4.7Meg	
R8	1Meg		66-5108340	BTS-1Meg	
R9	3.3Meg		66-5338340	BTS-3.3Meg	
R10	430Ω		66-1438340	BTS-430	
R11	150Ω		66-1158340	BTS-150	

PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING: IMPEDANCE PRI.	RATING: IMPEDANCE SEC.	RATING: DC RES. PRI.	RATING: DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	NOTES
T1	9.8KΩ	3.3Ω	410Ω	.87Ω	32-8628		A-2927			

SPEAKER

ITEM No.	RATINGS: SIZE	RATINGS: FIELD	RATINGS: V. C. IMP.	REPLACEMENT DATA: PHILCO PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	3½"	PM	3.3Ω	36-1652	35J4	3A07	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA: PHILCO PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1	Ant. Coil	1.2Ω		32-4600				
L2	Osc. Coil	1.5Ω	8.5Ω	32-4574	14-1060		71-Osc.	
L3	Input IF	25Ω	25Ω	32-4160-13A	16-6758	BC-352	12-C1	
L4	Output IF	30Ω	25Ω	32-4454-1A	16-6770 *	BC-355 *	12-C6 *	

* Disconnect C6 across primary.

BATTERIES

ITEM No.	VOLTAGE	PHILCO PART No.	REPLACEMENT DATA: EVEREADY "A"	EVEREADY "B"	EVEREADY "A-B"	BURGESS "A"	BURGESS "B"	BURGESS "A-B"	INSTALLATION NOTES
M1	1.5V	P77	964			2IR			2 Used in Parallel
M2	75V	P144		437			XX50		

MISCELLANEOUS

ITEM No.	PART NAME	PHILCO PART No.	NOTES
M3	Tuning cap	31-2772	2gang (15-240MMF, 11-110MMF)
M4	Switch		Battery saver (slide)
	Cabinet	11006-3	Cherry
	Cabinet	11006-1	Sand
	Cabinet	11006-2	Green
	Back cover	54-6077-3	Cherry
	Back cover	54-6077-1	Sand
	Back cover	54-6077-2	Green
	Handle (cabinet)	54-6078-3	Cherry
	Handle (cabinet)	54-6078-1	Sand
	Handle (cabinet)	54-6078-2	Green
	Dial scale	54-6083	
	Handle	54-6081	Battery saver
	Knob	54-6082	Volume
	Knob	54-6082-1	

PROPERTY OF
L. F. BLANKENSHIP
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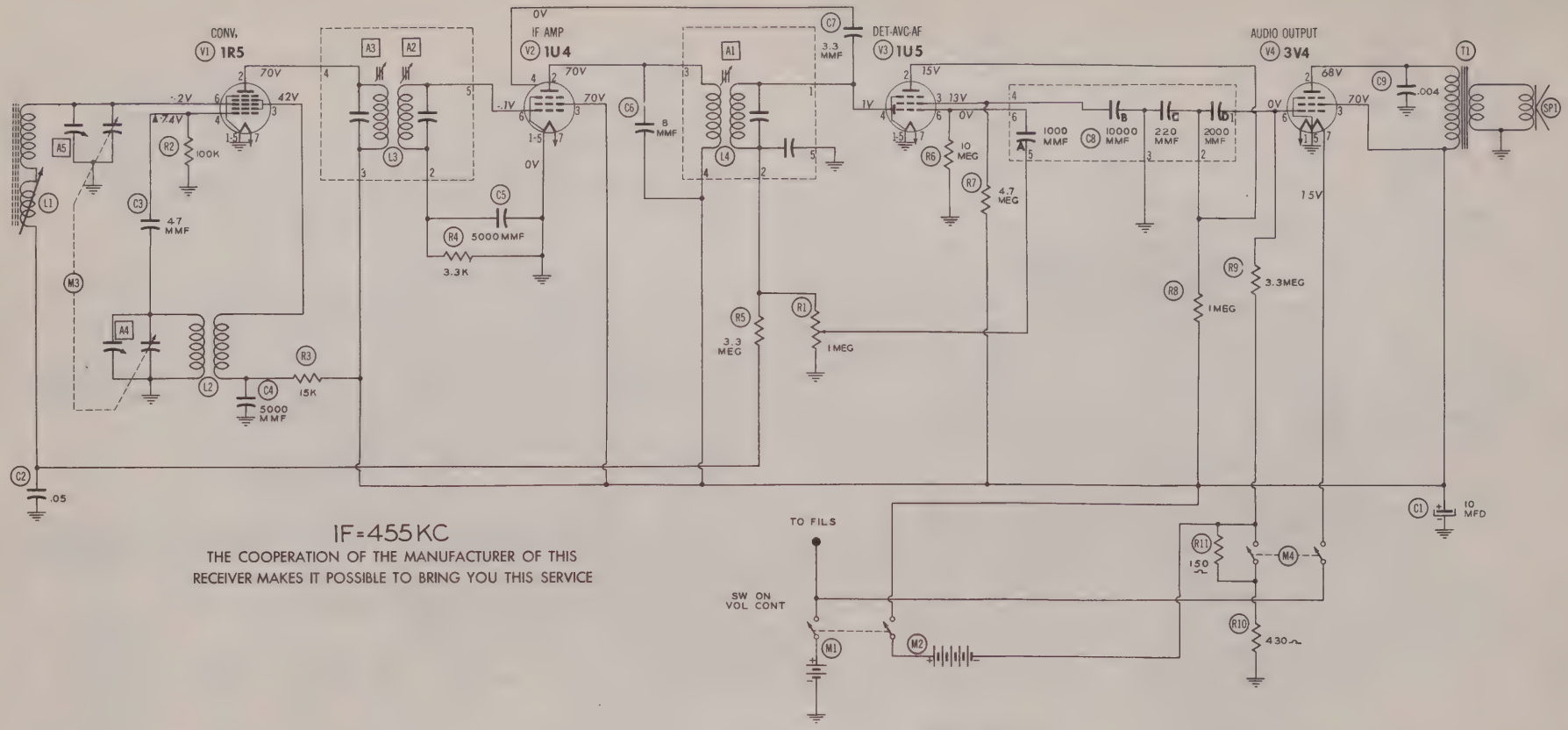
DENVER, COLORADO



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	1R5	0Ω	†25Ω	†15KΩ	100KΩ	0Ω	4.3Meg	*
V 2	1U4	0Ω	†30Ω	†0Ω	INF	0Ω	3.3Meg	*
V 3	1U5	0Ω	†1Meg	†4.7Meg	1Meg	INF	10Meg	*
V 4	3V4	■	†400Ω	†0Ω	♦580Ω	0Ω	3.3Meg	*

♦ MEASURED WITH BATTERY SAVER SWITCH OPEN
▲ TAKEN WITH VACUUM TUBE VOLTMETER
* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE
■ THIS READING ZERO IF BATTERY SAVER IS USED
† MEASURED FROM B+ LINE WITH SWITCH ON - BATTERIES REMOVED

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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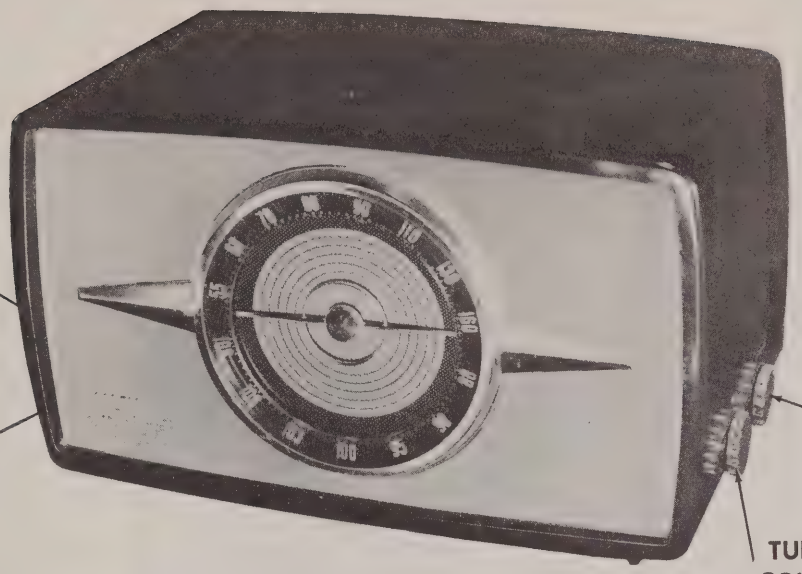
1 - DC Voltage measurements are at 20,000 ohms per volt, AC Voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Nominal tolerance on component values makes possible a variation of ±15% in voltage and resistance readings.
5 - Volume control at maximum, no signal applied for voltage measurements.

RCA VICTOR
MODEL 3-RF-91 (Ch. RC1129)



RCA VICTOR
MODEL 3-RF-91 (Ch. RC1129)

TRADE NAME	RCA Victor Model 3-RF-91 (Ch. RC1129)
MANUFACTURER	RCA Victor Div., Radio Corp. of America, Camden, N.J.
TYPE SET	AC Operated AM-FM Superheterodyne Receiver
TUBES (Nine)	Types 6CB6 RF Amp., 6X8 Conv., 6BA6 1st. FM-AM IF Amp., (2) 6AU6 FM IF Amp., 6AL5 Ratio Det., 6AV6 AM Det.-AVC-AF Amp., 6V6GT Audio Output, 5Y3GT Rectifier
POWER SUPPLY	110-120 Volts AC-60 Cycle — RATING .63 Amp. @ 117 Volts AC
TUNING RANGE - BROADCAST	540-1600KC — FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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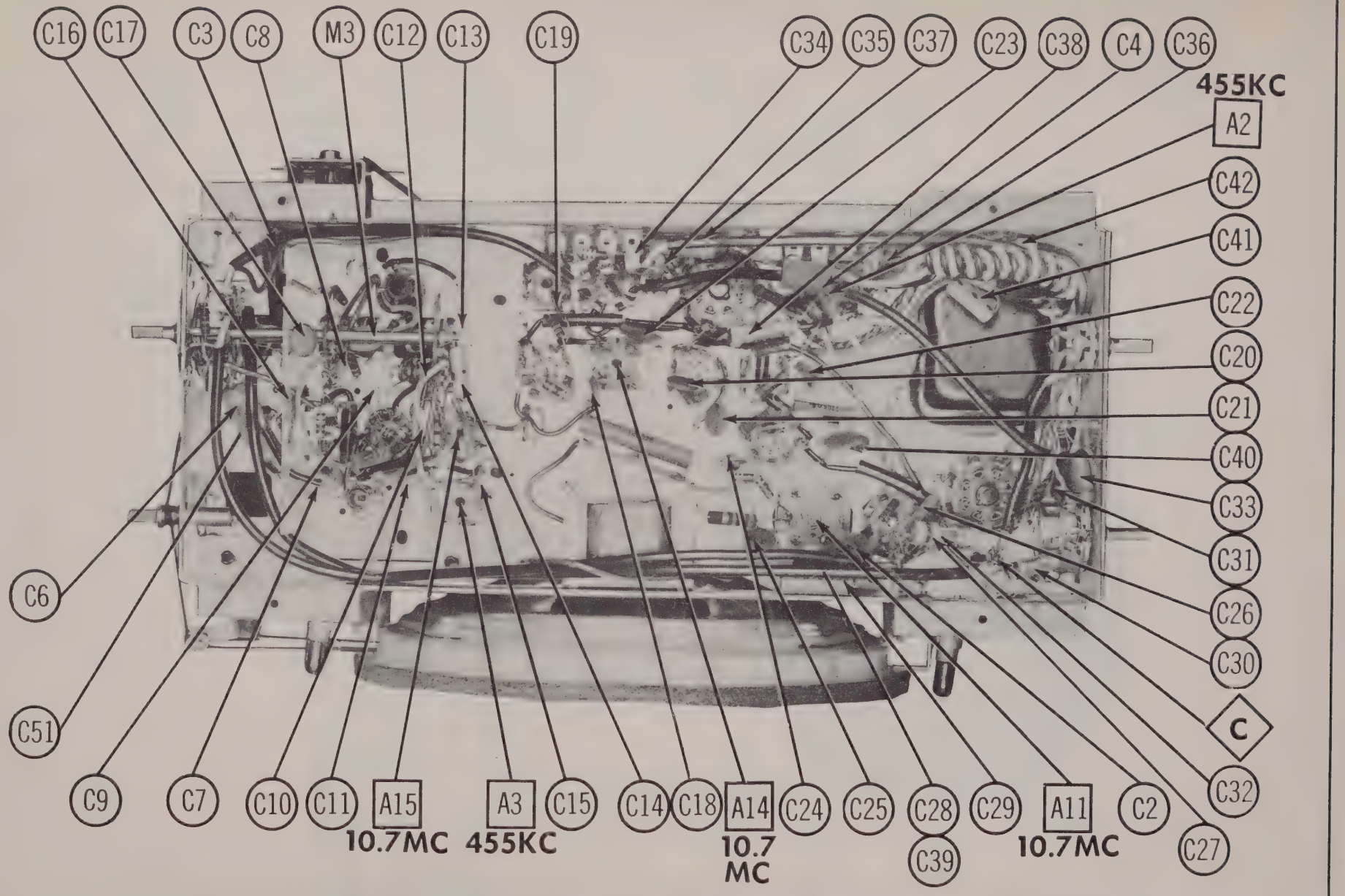
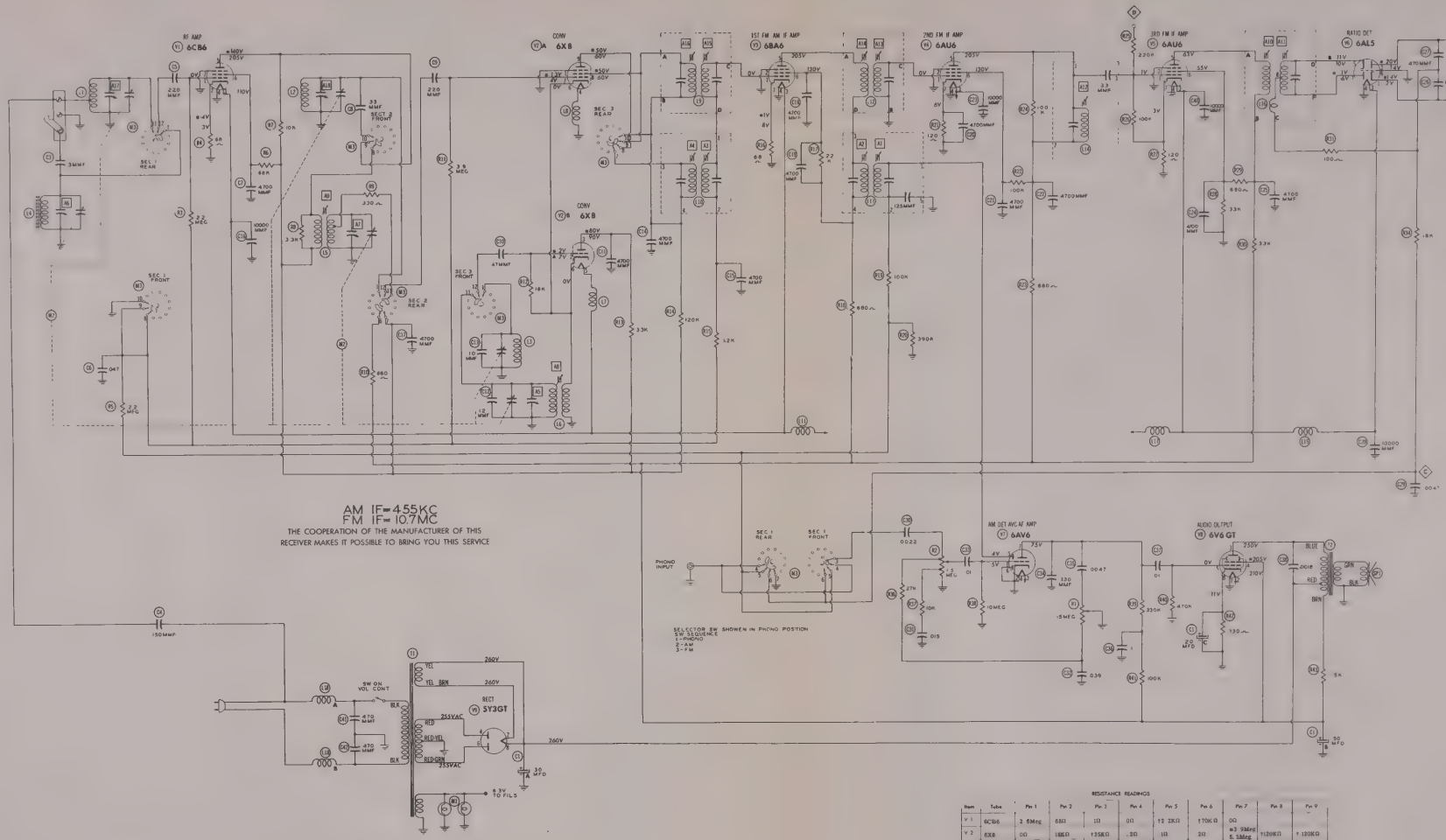


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6CB6	2.6Meg	68Ω	1Ω	0Ω	†2.2KΩ	†70KΩ	0Ω a3.9Meg b.5Meg	†120KΩ	†120KΩ
V 2	6X8	0Ω a1.2KΩ b.6Meg	16KΩ	†35KΩ	.5Ω	1Ω	2Ω			
V 3	6BA6	0Ω	.1Ω	0Ω	†2.2KΩ	†24KΩ	68Ω			
V 4	6AU6	6Ω	0Ω	1Ω	0Ω	†2.2KΩ	†105KΩ	120Ω		
V 5	6AU6	100KΩ	0Ω	.1Ω	0Ω	†34.5KΩ	†35.2KΩ	120Ω		
V 6	6AL5	2.2KΩ	40.2KΩ	1Ω	0Ω	18KΩ	0Ω	18KΩ		
V 7	6AV6	10Meg	0Ω	1Ω	0Ω	490KΩ	0Ω	†430KΩ		
V 8	6V6GT	INF	1Ω	†440Ω	†1.5KΩ	470KΩ	†100KΩ	0Ω	330Ω	
V 9	5Y3GT	INF	80KΩ	INF	18KΩ	INF	142Ω	INF	60KΩ	

† MEASURED FROM PIN 8 OF V8
a INDICATES READINGS IN FM POSITION-ALL OTHERS IN AM POSITION

1- DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2- Socket connections are shown as bottom views.
3- Measured values are from socket pin to common negative.
4- Line voltage maintained at 117 volts for voltage readings.
5- Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6- Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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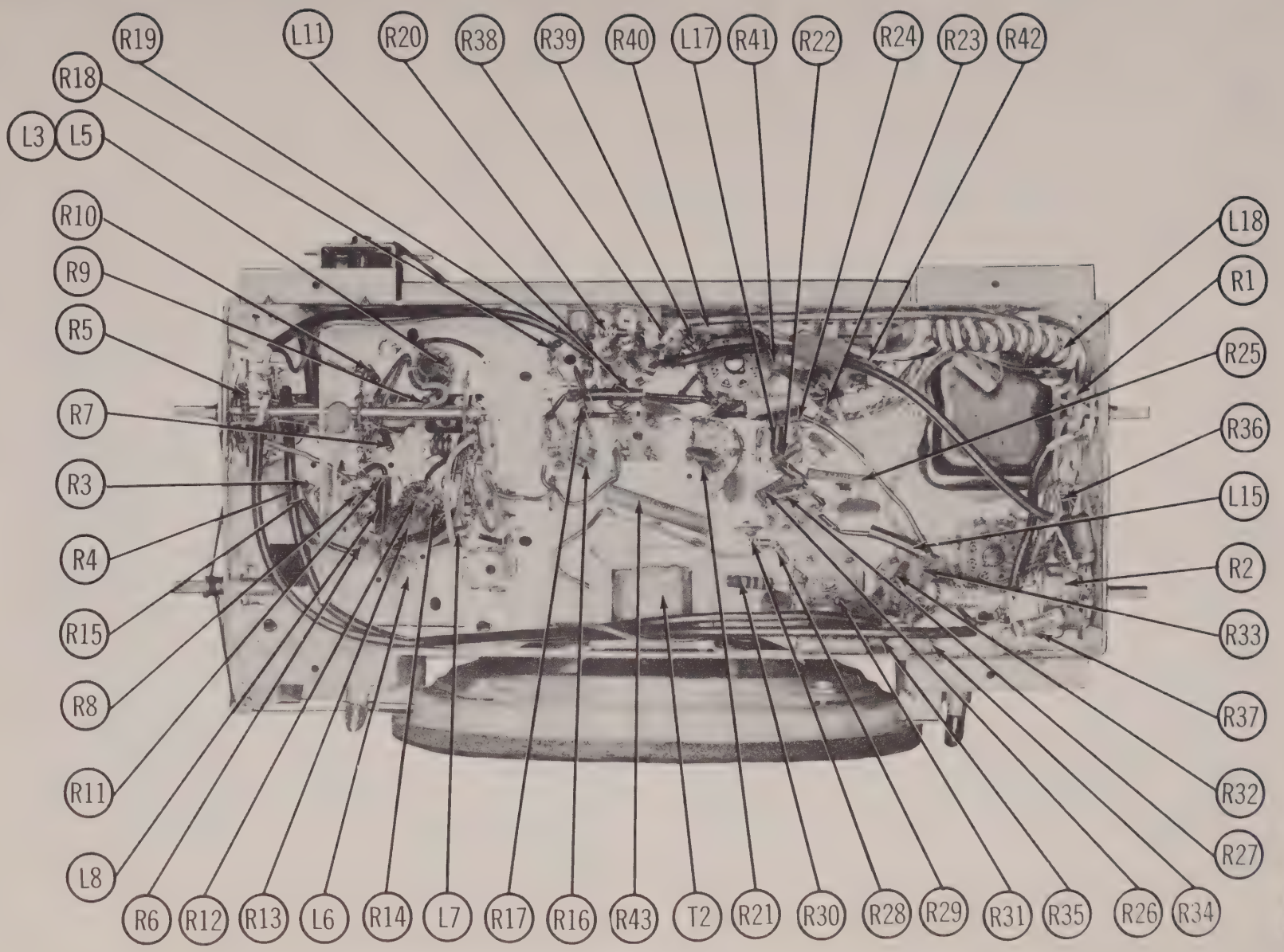


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

L. F. BLANKENSHIP
3924 MINOT ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

A slight interaction of adjustments on the tuning gang occurs between AM and FM.
If considerable adjustment is required of any circuit, check all other circuits in the following order:

1. FM IF
2. AM IF
3. AM Osc., Ant. and RF.
4. FM Osc., Ant. and RF

To set pointer turn tuning gang fully closed and set pointer parallel with base of chassis.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 1 (grid) of 6BA6 (V3). Low side to chassis.	455KC (400~Mod)	AM	Quiet point at low frequency end.	Across voice coil	A1, A2	Adjust for maximum deflection.
2.	"	High side to junction of R9 and tap of L5. Low side to chassis.	"	"	"	"	A3, A4	"
3.	Direct	High side to antenna input terminal No.1. Low side to chassis.	1620KC	"	Tuning gang fully open	"	A5	"
4.	"	"	1400KC	"	Tune to 1400KC signal	"	A6, A7	"
5.	"	"	600KC	"	Tune to 600KC signal	"	A8	Shunt a 10KΩ resistor across RF section of tuning gang. Adjust for maximum deflection while rocking gang thru 600KC signal. The correct peak will be obtained when the core is furtherest away from the coil mounting clips.
6.	"	"	"	"	"	"	A9	Remove 10KΩ resistor and adjust A9 for maximum deflection. If two peaks are obtainable, the correct peak will be the one with the core closest to the mounting clips.
7.	Repeat steps 3, 4, 5 and 6.							
8.	With receiver and antenna installed in cabinet tune in a weak station near 1400KC and adjust A6 for maximum volume.							

FM IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Connect two matched 56KΩ (±1%) resistors in series from point Ⓐ to chassis. The junction of these two resistors is alignment point Ⓑ as shown on the schematic.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	.01MFD	High side to pin 1 (grid) of 6AU6 (V5). Low side to chassis.	10.7MC (400~Mod)	FM	Quiet point at low frequency end	DC probe to point Ⓐ. Common to chassis.	A10	Adjust for maximum deflection. Attenuate signal generator to maintain 1 volt at VTVM.
10.	"	"	"	"	"	DC probe to point Ⓒ. Common to point Ⓑ.	A11	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
11.	"	High side to pin 1 (grid) of 6BA6 (V3). Low side to chassis.	"	"	"	DC probe to point Ⓓ. Common to chassis.	A12, A13 A14	Adjust for maximum deflection. If alternate loading is required to peak A13 and A14 shunt primary of L12 with 680Ω resistor and peak A13. Move 650Ω shunt resistor to secondary of L12 and peak A14.
12.	"	High side to FM RF stator lug on tuning gang. Low side to chassis.	"	"	"	"	A15, A16	Adjust for maximum deflection. If alternate loading is required to peak A15 and A16, shunt primary of L9 and peak A15. Move 680Ω shunt to secondary of L9 and peak A16. Remove 680Ω resistor.

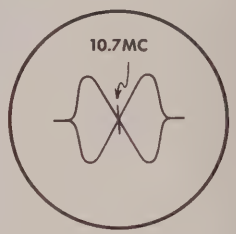


FIG. 1

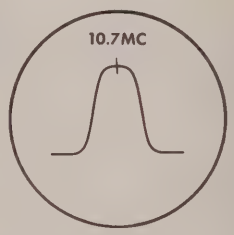


FIG. 2

FM IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
9.	.01MFD	High side to pin 1 (grid) of 6AU6 (V5). Low side to chassis.	10.7MC (400~Mod)	FM	Quiet point at low frequency end	Vert. Amp. to point Ⓑ. Low side to chassis.	A10, A11	Adjust A-11 so that 10.7MC occurs at center of crossover lines. Adjust A10 for maximum amplitude and straightness of crossover lines.
10.	"	High side to pin 1 (grid) of 6BA6 (V3). Low side to chassis.	"	"	"	Vert. Amp. to point Ⓓ. Low side to chassis.	A12, A13, A14	Adjust for maximum amplitude and symmetry as in Fig. 2. If alternate loading is required to peak A13 and A14, shunt primary of L12 with 680Ω resistor and peak A13. Move shunt resistor to secondary of L12 and peak A14.
11.	"	High side to FM RF stator lug on tuning gang. Low side to chassis.	"	"	"	"	A15, A16	Adjust for maximum amplitude and symmetry as in Fig. 2. If alternate loading is required to peak A15 and A16, shunt primary of L9 and peak A15. Move shunt to secondary of L9 and peak A16. Remove 680Ω resistor. Continue alignment with step 13.

FM RF ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
13.	270Ω Carbon Resistor	High side to FM antenna terminal #3. Low side to chassis.	90MC	FM	90MC	DC probe to point Ⓓ. Common to chassis.		Remove bottom shield. Compress or expand L3 for maximum deflection. Replace bottom shield.
14.	"	"	106MC	"	106MC	"	A17, A18	Adjust for maximum deflection.
15.	"	"	90MC	"	90MC	"		Compress or expand coils L1 and L2 for maximum deflection.
16.	Repeat steps 13, 14 and 15 until further adjustment does not improve calibration.							

OVERALL FM LINEARITY CHECK

A check of the overall FM linearity may be made by connecting the FM sweep generator to FM antenna terminals #3 and chassis. Connect the vertical amplifier of an oscilloscope to point Ⓒ. At 100% FM modulation these should be a peak-to-peak separation of 150KC with 50,000 microvolts input before distortion of the sine wave is noticeable.

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

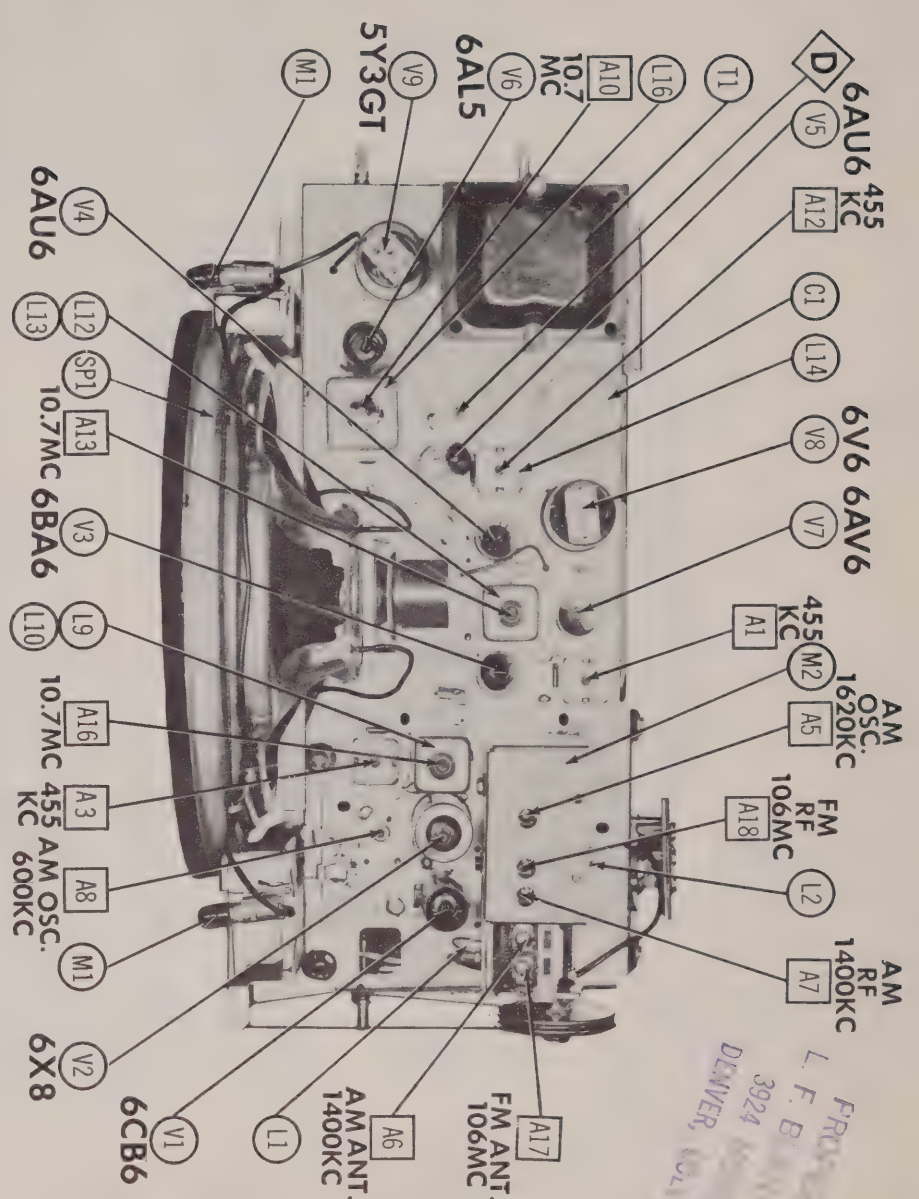
ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	NOTES
		RCA Victor PART No.	STANDARD REPLACEMENT		
V1	RF Amplifier	6CB6	6CB6	7CM	
V2	Converter	6X8	6X8	9AK	
V3	1st. FM AM IF Amp.	6BA6	6BA6	7BK	
V4	2nd. FM IF Amp.	6AU6	6AU6	7BK	
V5	3rd. FM IF Amp.	6AU6	6AU6	7BK	
V6	Ratio Detector	6AL5	6AL5	6BT	
V7	AM Detector-AVC-AF Amp.	6AV6	6AV6	7BT	
V8	Audio Output	6V6GT	6V6GT	7S	
V9	Rectifier	5Y3GT	5Y3GT	5T	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲30	350	76330	AFH3-186		DO42		FP419.3	R1439	
B	■50	300								
C	▲20	25								
C2	2	50	73747	PRS150/4		BBR2-50T		TC302	TVA-1301	
C3	3		77277	SI3NP0				ZT-553		
C4	150	500	39632	1468-00015	D6-151	5W5T15		MC-236	1FM-315	
C5	220		71920	SI220	D6-221		GP2K-221	UC-5322	5GA-T22	
C6	.047	200	73558	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C7	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C8	33		70596	SI33	D6-330		GP2K-330	UC-5433	5GA-Q33	
C9	220		71920		TCN-220				5TCU-T22	
C10	47		39042	SI47N750	TCN-47		N750K-470	NT-5447	5TCU-Q47	
C11	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C12	12		76349							
C13	10		76350	SI10N750		TCN-10	N750K-100	NT-541	5TCU-Q1	
C14	4700		73473	BPD-0047	D6-472	TM5D 5	GP2-333-472	UC-5247	5HK-D47	
C15	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C16	10000		73960	BPD-01	DD-1032	TM5S1	801-01	PC-511	5HK-S1	
C17	4700	500	39668	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C18	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C19	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C20	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C21	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C22	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C23	10000		73960	BPD-01	DD-1032	TM5S1	GP2-333-103	DC-511	5HK-S1	
C24	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C25	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C26	470	500	77941	1468-0005	D6-471	5R5T5	GP2K-471	MC245	1FM-35	
C27	470	500	77941	1468-0005	D6-471	5T5T5	GP2K-471	MC245	1FM-35	
C28	4700		73473	BPD-0047	D6-472	TM5D5	GP2-333-472	UC-5247	5HK-D47	
C29	.0047	400	73920	P488-0047	D6-472	PTE6D47	GP2-333-472	PT6247	4TM-D47	
C30	.0022	200	77942							
C31	.015	200	77943	P488-015		PTE6S15			4TM-S15	
C32	.039	200	77989							
C33	.01	200	77424	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C34	330		76552	SI330	D6-331		GP2K-331	UC-5333	5GA-T33	
C35	.0047	400	73920	P488-0047	D6-472	PTE6D47		PT6247	4TM-D47	
C36	.1	400	73551	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C37	.01	400	73561	P488-01	D6-103	PTE4S1	GP2-333-101	PT411	4TM-S1	
C38	.0018	1000	73851							
C39	10000		73960	BPD-01	DD-1032	TM5S1	811-01	DC-511	5HK-S1	
C40	10000		73960	BPD-01	DD-1032	TM5S1	811-01	DC-511	5HK-S1	
C41	470	500	39644		D6-471		GP2K-471			
C42	470	500	39644		D6-471		GP2K-471			

CHASSIS—TOP VIEW



FROM L. F. B. 3924 DENVER, COLO.

PARTS LIST AND DESCRIPTIONS (Continued)

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	RCA Victor PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	15Meg	½	77936	Q12-141	AG-69-Z	AB-85	U-65	Tone -Note
B	Shaft		Not Req.	Not Req.	FS-3	AK-3	Not Req.	Attach to R1A
R2A	1.5Meg	½	70342	Q18-139XX	AT-95		UDT-291	Volume
B	Shaft		Not Req.	Not Req.	FS-3		Not Req.	Attach to R2A
C	Switch		Not Req.	76-1	SWA		US-26	

Note 1. This control must be at least 2Meg.

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA Victor PART No.	IRC PART No.	
R3	2.2Meg	½	503522	BTS-2.2Meg	
R4	68Ω	½	503068	BTS-68	
R5	2.2Meg	½	503522	BTS-2.2Meg	
R6	68KΩ	½	503368	BTS-68K	
R7	10KΩ	½	503310	BTS-10K	
R8	3300Ω	½	503233	BTS-3300	
R9	330Ω	½	503133	BTS-330	
R10	680Ω	½	503168	BTS-680	
R11	3.9Meg	½	503539	BTS-3.9Meg	
R12	18KΩ	½	503318	BTS-18K	
R13	33KΩ	1	513333	BTA-33K	
R14	120KΩ	½	503412	BTS-120K	
R15	1200Ω	½	503212	BTS-1200	
R16	68Ω	½	503068	BTS-68	
R17	22KΩ	½	503322	BTS-22K	
R18	680Ω	½	503168	BTS-680	
R19	100KΩ	½	503410	BTS-100K	
R20	390KΩ	½	503439	BTS-390K	
R21	120Ω	½	503112	BTS-120	
R22	100KΩ	½	503410	BTS-100K	
R23	680Ω	½	503168	BTS-680	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA Victor PART No.	IRC PART No.	
R24	100KΩ	½	503410	BTS-100K	
R25	220KΩ	½	503422	BTS-220K	
R26	100KΩ	½	503410	BTS-100K	
R27	120Ω	½	503112	BTS-120	
R28	33KΩ	½	503333	BTS-33K	
R29	680Ω	½	503168	BTS-680	
R30	33KΩ	1	513333	BTA-33K	
R31	100Ω	½	503110	BTS-100	
R32	2200Ω	½	503222	BTS-2200	
R33	1200Ω	½	503212	BTS-1200	
R34	18KΩ	½	503318	BTS-18K	
R35	39KΩ	½	503339	BTS-39K	
R36	27KΩ	½	503327	BTS-27K	
R37	10KΩ	½	503310	BTS-10K	
R38	10Meg	½	503610	BTS-10Meg	
R39	330KΩ	½	503433	BTS-330K	
R40	470KΩ	½	503447	BTS-470K	
R41	100KΩ	½	503410	BTS-100K	
R42	330Ω	1	513133	BTA-330	
R43	1500Ω	4	52436	PW4-1500	

TRANSFORMER (POWER)

ITEM No.	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	RCA Victor PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
T1	117VAC @ .32A	518VCT .075ADC	5VAC @ 2A	6.3VAC @ 3.5A	76326				

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		RCA Victor PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T2	9KΩ	3.7Ω	450Ω tap @ 9.4Ω	.58Ω	77940					

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	RCA Victor PART No.	JENSEN PART No.	QUAM PART No.	
SP1	8"	PM	3.7Ω	74664	ST-115 Mod. P8-V	8A21	

PARTS LIST AND DESCRIPTIONS (Continued)

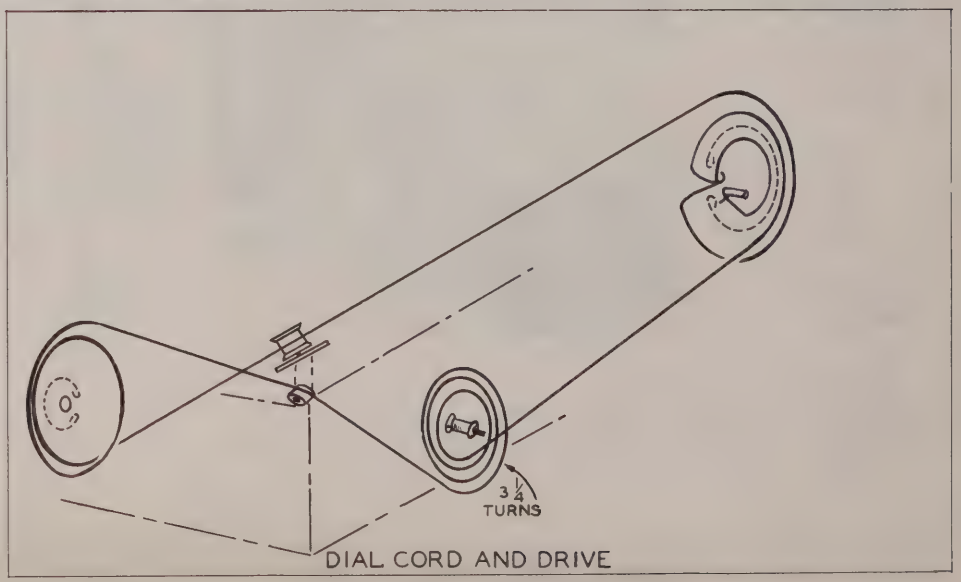
COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM Ant. Coil	0Ω		76354				Tapped
L2	FM RF Coil	0Ω		76353				
L3	FM Osc. Coil	0Ω		77973				
L4	AM Loop Ant.	.1Ω		76343				
L5	AM RF Coil	1.9Ω	4.4Ω	76338	14-1076			Secondary tapped @ 1.5Ω
L6	AM Osc. Coil	2Ω	5.5Ω	76337	14-1077		71-Osc.	
L7	Fil. Choke	.3Ω		76351			4612	9 Microhenries
L8	Fil. Choke	.3Ω		76351			4612	9 Microhenries
L9	1st. FM IF	.2Ω	.2Ω	75559	16-3471	FM-251	1451	
L10	1st. AM IF	6Ω	6Ω	76335	16-6758	BC-352	12-C1	
L11	Fil. Choke	0Ω		71942	19-3001	TV-189	4602	1 Microhenry
L12	2nd. FM IF	1.1Ω	.4Ω	76329	16-3472	FM-251	1451	
L13	2nd. AM IF	7.5Ω	7.5Ω	76328	16-6770	12-C6	BC-355	
L14	3rd. FM IF	1.1Ω		77939	16-3487 *	FM-254 *	1463 *	Includes 33MMF Cap.
L15	Fil. Choke	0Ω		71942	19-3001	TV-189	4602	1 Microhenry
L16	Ratio Det.	1Ω	.1Ω CT	77938	17-3488	FM-252	1453	Tertiary winding-.2Ω
L17	Fil. Choke	0Ω		71942	19-3001	TV-189	4602	1 Microhenry
L18A	RF Choke	0Ω						
B	RF Choke	0Ω						

* Detune unused winding and add 33MMF Cap. externally.

MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M1	Dial Light	11891	#44 (2 used)
M2	Tuning Cap.	76333	6 Section - AM (22-337MMF, 19-244MMF, 21-167MMF)
M3	Switch	76334	Function Selector Phono-AM-FM
	Cabinet	Y2519	Less decals - plastic
	Decals	76767	Control Functions
	Knob	77232	Function Selector (Maroon)
	Knob	77233	Tuning, tone and volume power control (3 used)
	Pointer	77948	Station Selector
	Back Cover	76359	



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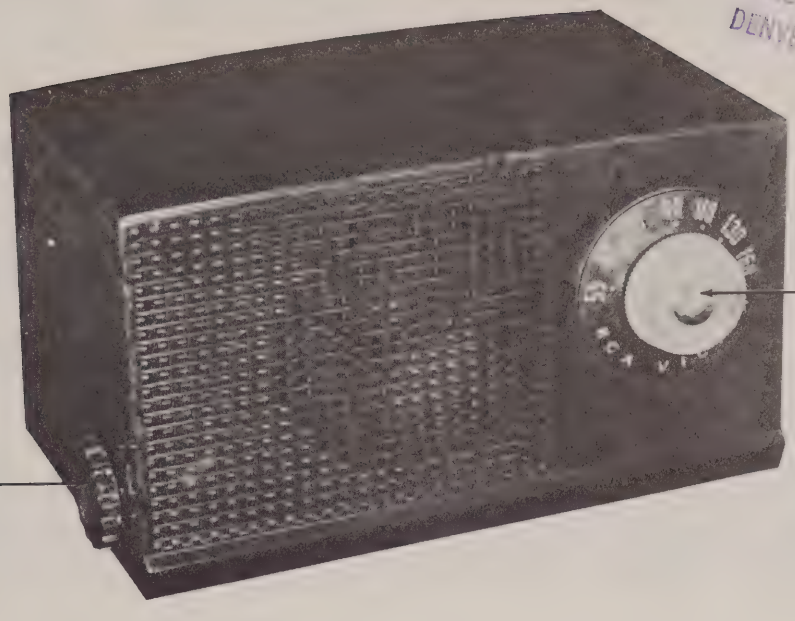
RETMA MEMBER

RCA VICTOR
MODELS 3-X-521, 3-X-532, 3-X-533, 3-X-534, 3-X-535, 3-X-536 (Ch. RC1128)

PROPERTY OF
L. F. BLANKENSHIP
3024 NEOSHO ST.
DENVER, COLORADO

RCA VICTOR
MODELS 3-X-521, 3-X-532, 3-X-533, 3-X-534, 3-X-535, 3-X-536 (Ch. RC1128)



RCA VICTOR
MODELS 3-X-521, 3-X-532, 3-X-533, 3-X-534, 3-X-535, 3-X-536 (Ch. RC1128)

TRADE NAME	RCA Victor Models 3-X-521, 3-X-532, 3-X-533, 3-X-534, 3-X-535, 3-X-536 (Ch. RC1128)
MANUFACTURER	RCA Victor Div., Radio Corp. of America, Camden, N.J.
TYPE SET	AC-DC Operated AM Superheterodyne Receiver
TUBES (Five)	Types 12BE6 Conv., 12BA6 IF Amp., 12AV6 Det.-AVC-AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC-DC RATING .25 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	540-1600KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and B-. To set pointer, turn tuning capacitor fully closed and set pointer to last reference mark at low frequency end of dial. Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.01MFD	High side to pin 1 (grid) of 12BA6 (V2). Low side to chassis.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2,	Adjust for maximum output . If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	"	High side to antenna stator lug on tuning gang. Low side to chassis.	"	"	"	A3, A4	"
3.		Loop	1620KC	"	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
4.		"	1400KC	Tune to 1400KC signal	"	A6	"
5.	Repeat steps 3 and 4.						

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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	NOTES
		RCA Victor PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	IF Amplifier	12BA6	12BA6	7BK	
V3	Det-AVC-AF-Amp.	12AV6	12AV6	7BT	
V4	Audio Output	50C5	50C5	7CV	
V5	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA						NOTES
	CAP.	VOLT	RCA Victor PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	50	150	77427	PRS150/50-30		BBRD-5315		TCD-497	TVA-2450	Red Green
B	30	150								
C2	.047	200	73558	P288-047	DF-503	PTE4S47		PT4147	2TM-S47	
C3	68	500	39624							
C4A	220									
B	5000									
C	5000		*77995	*PA-113-2	*PC-151		*1408-02		*103C5	
D	250									
E										
C5	.015	400	73797	P488-015		PTE4S15		PT4115	4TM-S15	
C6	.047	400	75071	489ZX-05		PJ4S47		PT4147	4TM-S47	
C7	.1	400	73551	P488-1		PTE4P1		PT401	4TM-P1	

* Items C4A, C4B, C4C, C4D, C4E, R7A, R7B and R7C are combined in one unit.
Items C4D and C4E should total 250MMF when replaced separately.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	RCA-Victor PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	1Meg	½	77992	Q13-137	AG-63-Z		U-53	Volume
B	Shaft		Not Req.	Not Req.	FS-3		Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB		US-26T	Attach to R1A

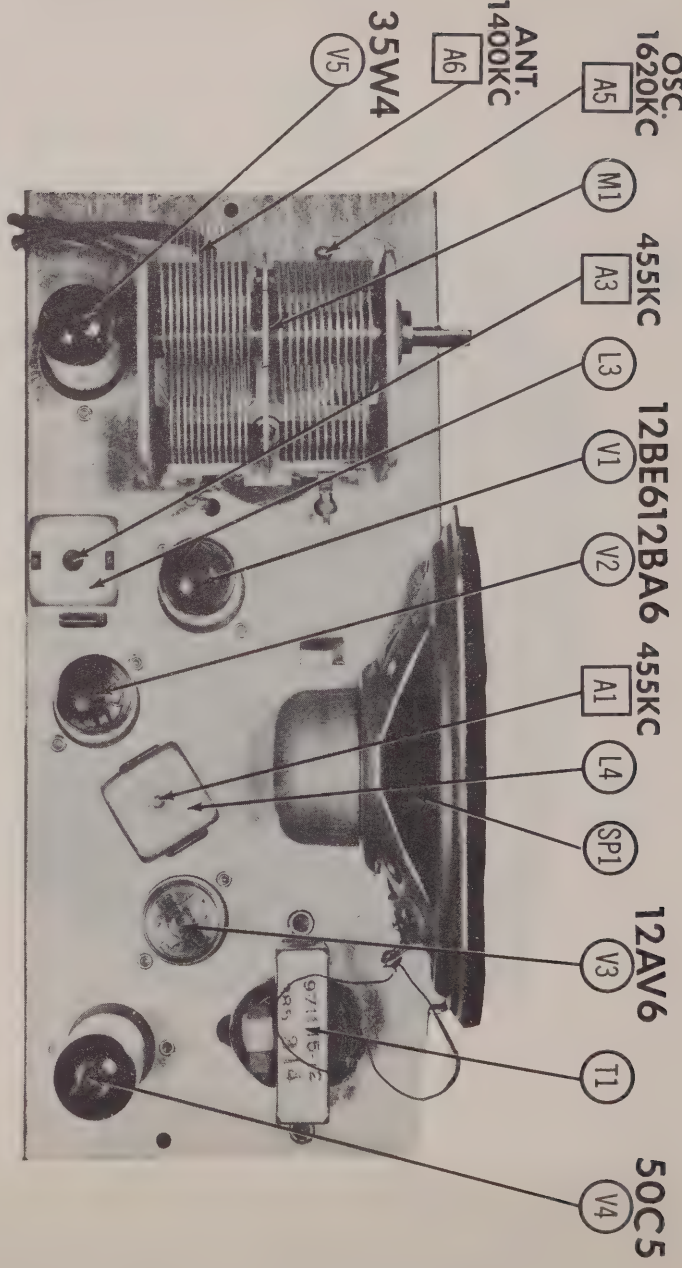
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA-Victor PART No.	IRC PART No.	
R2	22KΩ	½	503322	BTS-22K	
R3	100Ω	½	503110	BTS-100	
R4	100Ω	½	503110	BTS-100	
R5	3.3Meg	½	503533	BTS-3.3Meg	
R6	47KΩ	½	503347	BTS-47K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	RCA-Victor PART No.	IRC PART No.	
R7A	6.8Meg	½	♦ 77995	BTS-6.8Meg	
B	470KΩ	½		BTS-470K	
C	470KΩ	½		BTS-470K	
R8	150Ω	½	503115	BTS-150	
R9	1200Ω	1	513212	BTA-1200	
R10	33Ω	½	503033	BTS-33	Note

♦ Items R7A, R7B, R7C, C4A, C4B, C4C, C4D, C4E are combined in one unit.
Note: Not used in all models.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		RCA Victor PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.7KΩ	3.2Ω	276Ω	.68Ω	77993	A-3332	A-3025	RO-302 ①	S-IX ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	RCA Victor PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.2Ω	76391	ST-113 Mod. P4-X	4A07	

COILS (RF-IF)

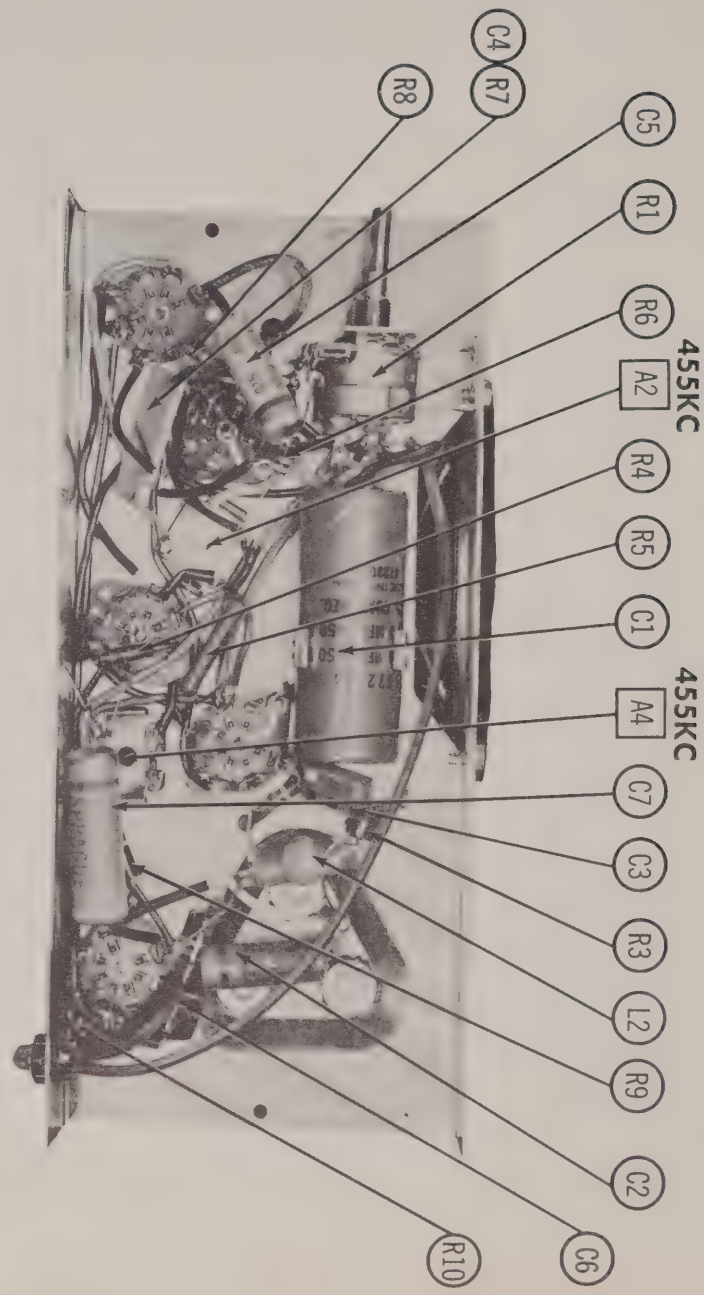
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	RCA Victor PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Loop Ant.	3.1Ω		77990				Includes back cover
L2	Osc. Coil	1Ω	8Ω	77450	14-1074		71-Osc *	
L3	Input IF	18Ω	18Ω	75486	16-6758	BC-352	12-C1	
L4	Output IF	25Ω	11Ω	77994	16-6758	BC-353	12-C2	

* Disregard tap on secondary winding.

MISCELLANEOUS

ITEM No.	PART NAME	RCA Victor PART No.	NOTES
M1	Tuning cap	77991	2gang (38-417MMF, 26-170MMF)
	Cabinet	Y2520	Brown model 3X521
	Cabinet	Y2521	Ivory Model 3X532
	Cabinet	Y2522	Green Model 3X533
	Cabinet	Y2523	Tan Model 3X534
	Cabinet	Y2524	Red Model 3X535
	Cabinet	Y2525	White Model 3X536
	Knob	77996	Tuning-gray-Model 3X521
	Knob	77233	Off-on volume-Model 3X521-maroon
	Knob	77997	Tuning-clear-Models 3X532-3-4-5-6
	Knob	77998	Off-on volume-ivory Model 5X532
	Knob	77999	Off-on volume-green Model 5X533
	Knob	78001	Off-on volume-tan Model 5X534
	Knob	78002	Off-on volume-red Model 5X535
	Knob	78003	Off-on volume-white Model 5X536

CHASSIS—BOTTOM VIEW



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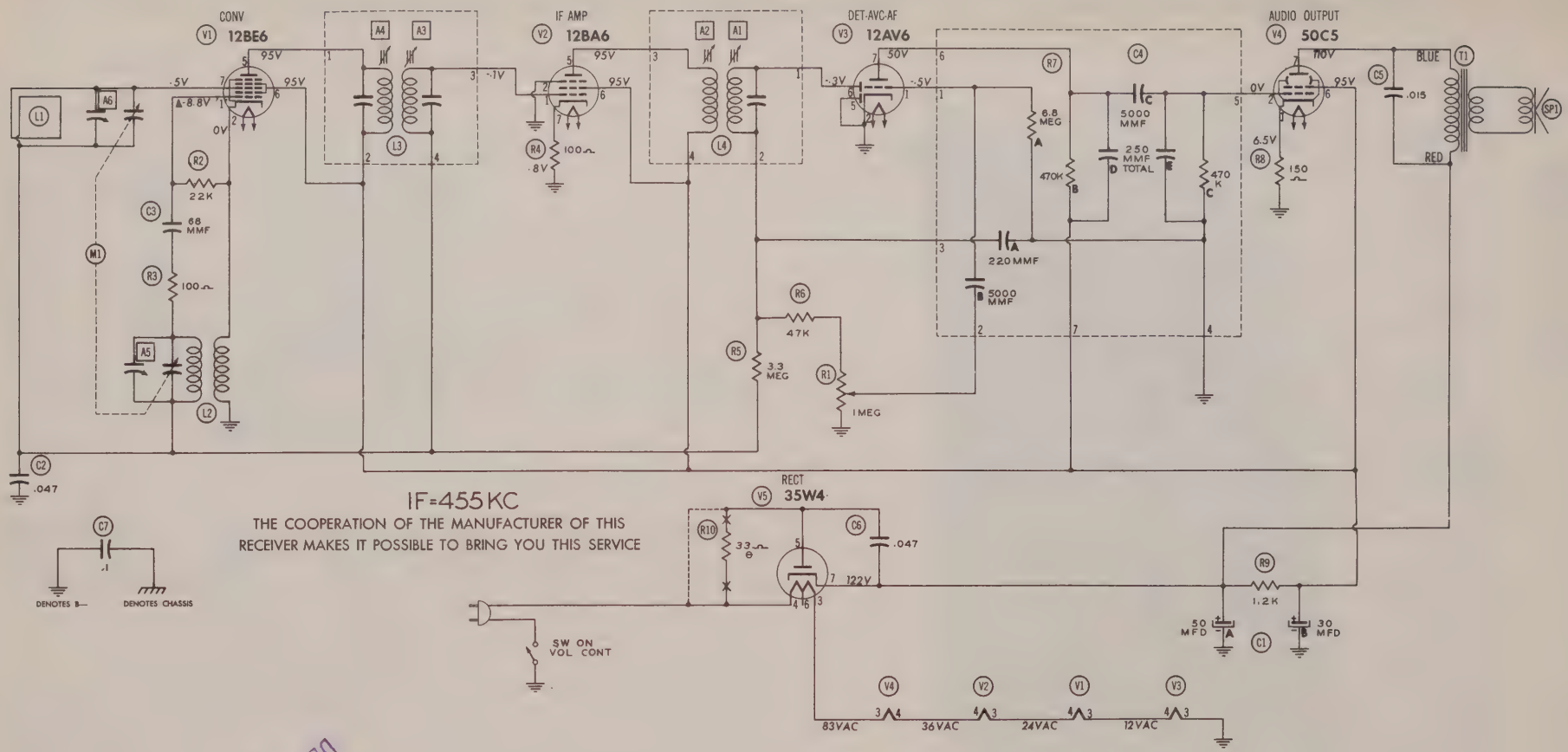

IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

PROPERTY OF
L. F. BLANKENSHIP
3324 HEADE ST.
DENVER, COLORADO

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BE6	22KΩ	1Ω	16Ω	29Ω	†1. 2KΩ	†1. 2KΩ	4. 3Meg
V 2	12BA6	4. 3Meg	0Ω	29Ω	45Ω	† 1. 2KΩ	† 1. 2KΩ	100Ω
V 3	12AV6	6. 8Meg	0Ω	0Ω	16Ω	0Ω	1Meg	† 470KΩ
V 4	50C5	150Ω	470KΩ	130Ω	45Ω	INF	† 1. 2KΩ	† 275Ω
V 5	35W4	0Ω	INF	130Ω	190Ω	220Ω	170Ω	500KΩ

▲ TAKEN WITH VACUUM TUBE VOLTMETER
† MEASURED FROM PIN 7 OF V5

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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226-7

1- DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2- Socket connections are shown as bottom views.
3- Measured values are from socket pin to common negative.
4- Line voltage maintained at 117 volts for voltage readings.
5- Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6- Volume control at maximum, no signal applied for voltage measurements.

PHOTOFACT* Folder

SENTINEL MODELS 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

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MODEL 1U521

SENTINEL MODELS 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

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PHOTOFACT* Folder

*TRADE MARK

RETMA MEMBER

SENTINEL MODELS 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

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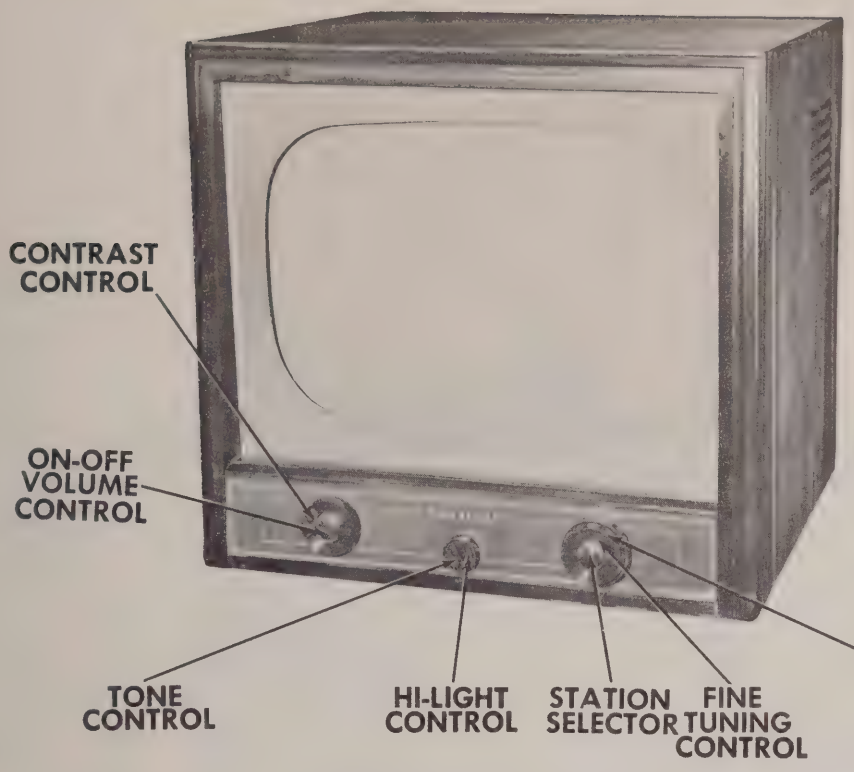

SENTINEL MODEL 1U521

TRADE NAME	Sentinel Models 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525.
MANUFACTURER	Sentinel Radio Corp., 2100 W. Dempster, Evanston, Ill.
TYPE SET	Television Receiver
TUBES	Nineteen
POWER SUPPLY	110-120 Volts AC-60 cycle RATING 1.56 Amp. @ 117 Volts AC
TUNING RANGE—	Channels 2 thru 13 VHF, 14 thru 83 UHF, Video IF 45.75MC Sound IF 41.25MC (Intercarrier)

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SENTINEL MODELS 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

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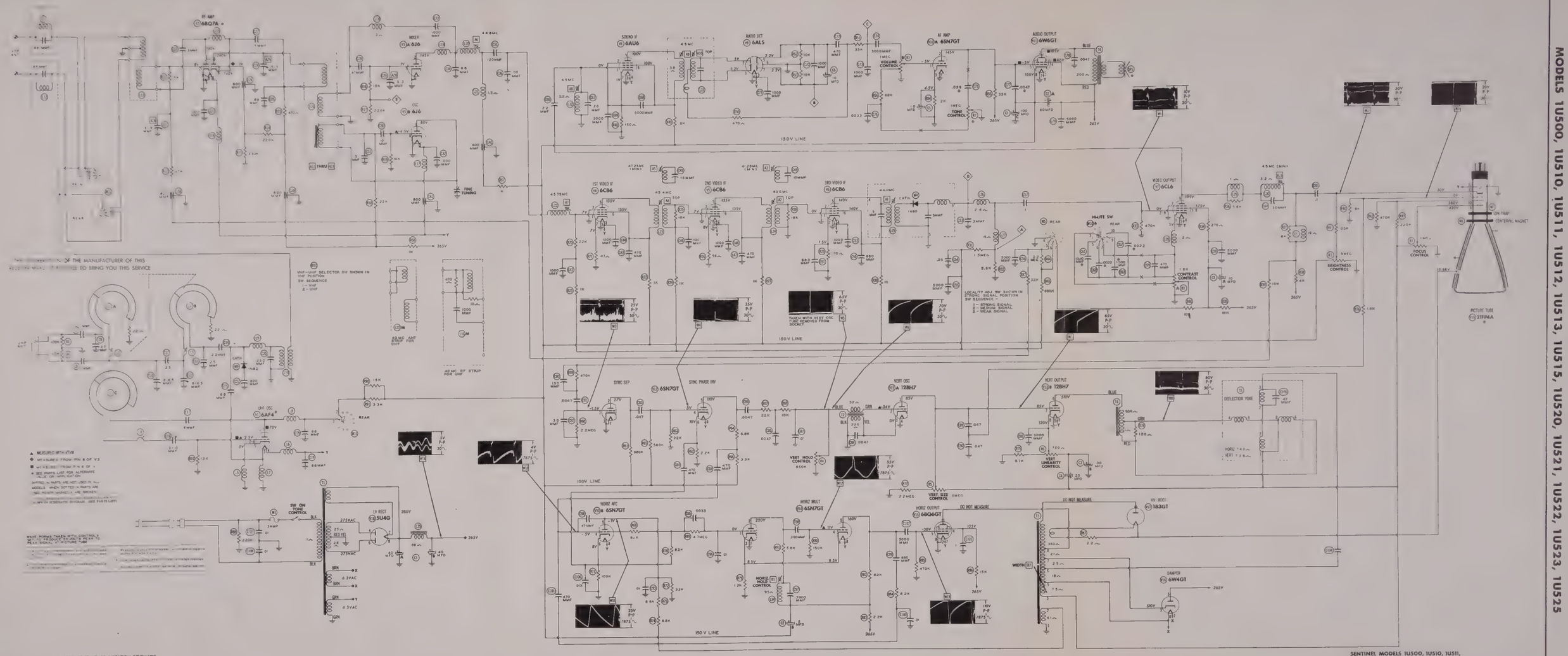
DATE 1-54 SET 226 FOLDER 8



SENTINEL
MODELS 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

SENTINEL MODELS 1U500, 1U510, 1U511,
1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

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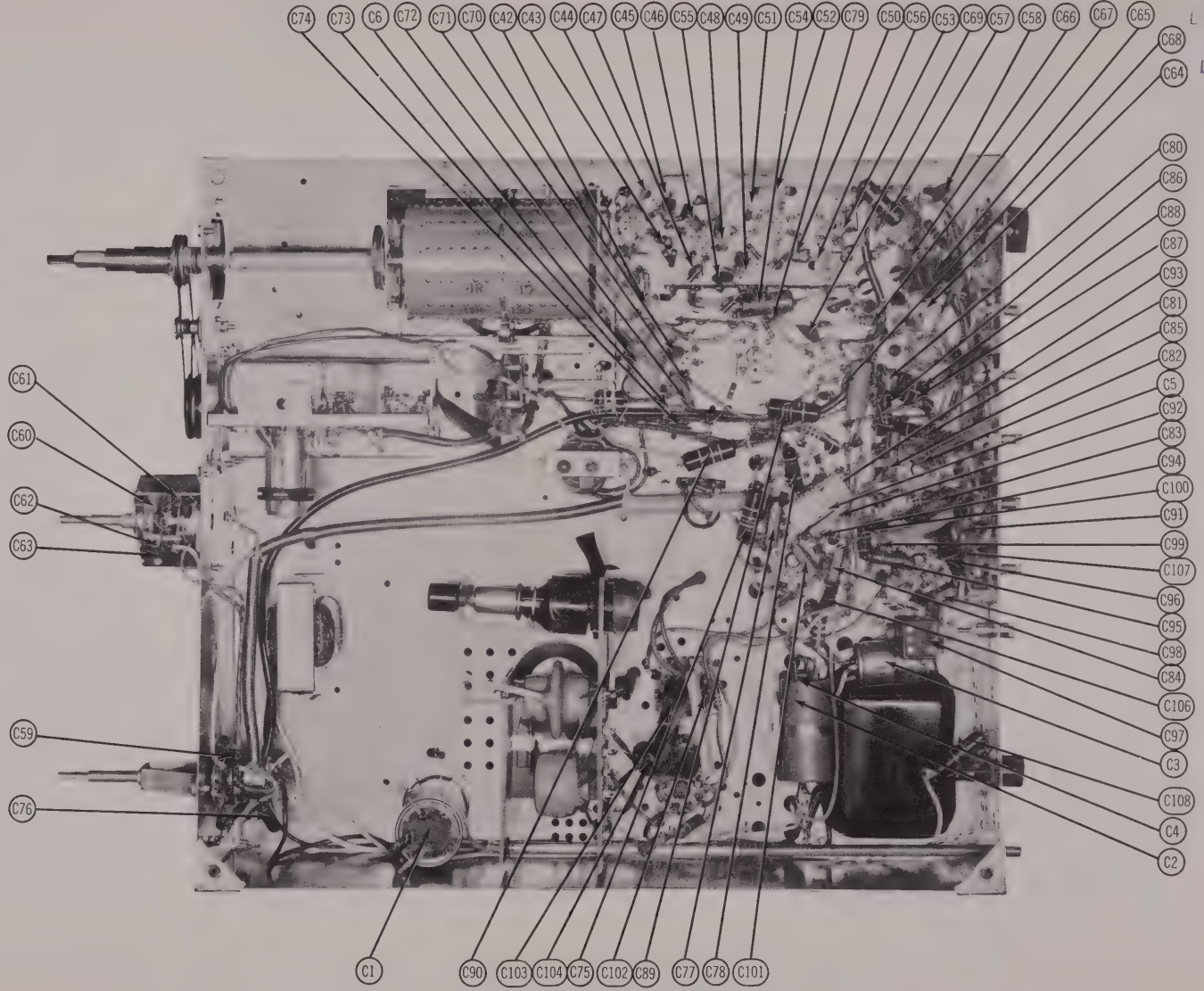
CHASSIS TOP VIEW



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

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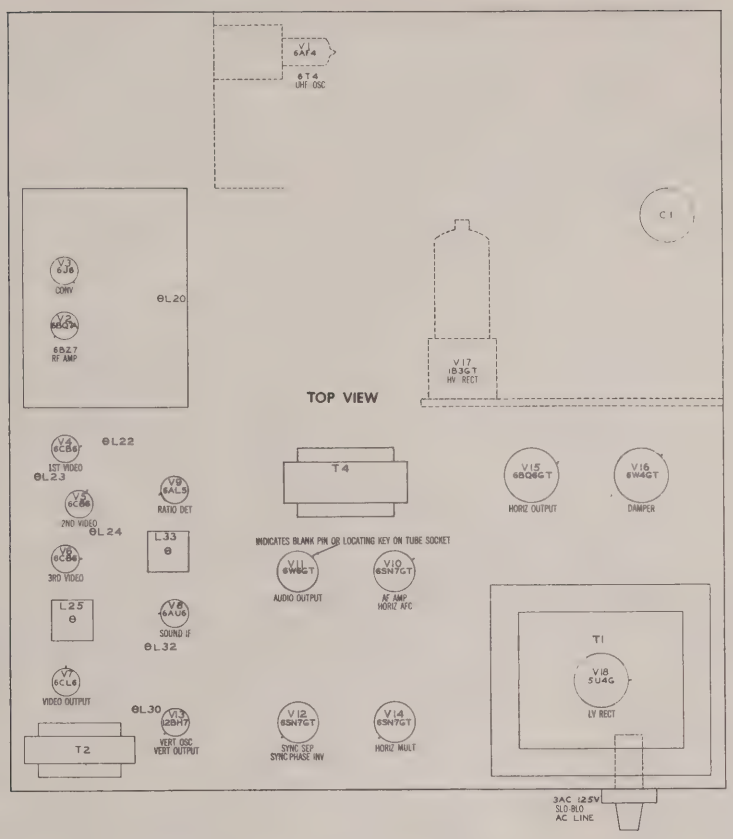
[illegible]
DENVER, COLORADO

TUBE PLACEMENT CHART



TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V18, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7, V11 (V1, UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V7, V19
Has pic, no sound - V8, V9, V10, V11

SYNC FAILURE
No vert. sync - V12, V13
No horiz. sync - V10, V12, V14
No vert. or horiz. sync - V12

SWEEP FAILURE
No raster, has sound - V14, V15, V16, V17, V19
No vertical deflection - V13
Poor vert. linearity or foldover - V13
Poor horiz. linearity or foldover - V14, V15, V16
Narrow picture - V14, V15, V16, V17, V18
Vert. off freq. - V12, V13
Horiz. off freq. - V10, V12, V14

SENTINEL MODELS 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage lead should be securely taped and kept away from the chassis. Do not remove the horizontal oscillator tube to disable the high voltage.
Set the locality switch to "Strong Signal" position during alignment.

VIDEO IF ALIGNMENT

Remove the converter tube, V3, from its socket and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 3 volt battery to the ungrounded side of C54. Connect the positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	44.0MC	Any	DC probe thru 47KΩ to point (A). Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	43.0MC	"	"	A2	"
3.	"	"	41.25MC	"	"	A3	Adjust for MINIMUM Deflection.
4.	"	"	45.4MC	"	"	A4	Adjust for maximum deflection.
5.	"	"	47.25MC	"	"	A5	Adjust for MINIMUM deflection.
6.	"	"	44.6MC	"	"	A6	Detune A7 by turning slug out as far as possible.
7.	"	"	45.75MC	"	"	A7	Adjust for maximum deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
8.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	44MC (10MC Swp)	41.25MC 42.25MC 45.75MC 47.25MC	Any	Vert. amp. thru 47KΩ to point (A). Low side to chassis.		Adjust for response curve similar to Fig. 1. If necessary, retouch A1, A2, A4, A6, and A7 for desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

Remove 6CB6 (V6) from its socket.
Set contrast control for maximum contrast.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
9.	.001MFD	High side to point (D). Low side to chassis.	4.5MC (unmod)	Any	DC probe thru 47KΩ to point (B). Common to chassis.	A8, A9	Adjust for maximum deflection. Alternate generator output to maintain less than 10 volts at VTVM.
10.	"	"	"	"	DC probe thru 47KΩ to point (C). Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Remove 6CB6 (V6) from its socket.
Set contrast control for maximum contrast.
Use frequency modulated signal with 60% modulation and 450KC sweep. Use 120% sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	.001MFD	High side to point (D). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. amp. thru 47KΩ to point (B). Low side to chassis.	A8, A9	Disconnect stabilizer capacitor C6. Adjust for curve of maximum amplitude and symmetry as in Fig. 2.
10.	"	"	"	"	"	Vert. amp. thru 47KΩ to point (C). Low side to chassis.	A10	Reconnect stabilizer capacitor C6. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 3. Slightly retouch A9 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
11.	.001MFD	High side to pin 11 (cathode) of picture tube. Low side to chassis.	4.5MC (unmod)	"	DC probe thru 47KΩ to point (B). Common to chassis.	A11	Adjust for MINIMUM deflection.

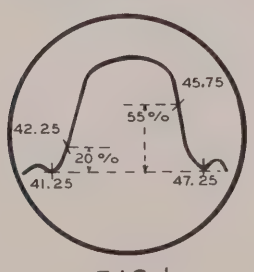


FIG. 1

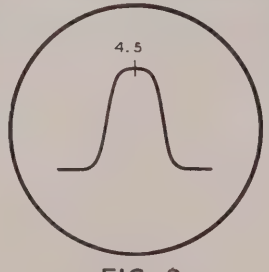


FIG. 2

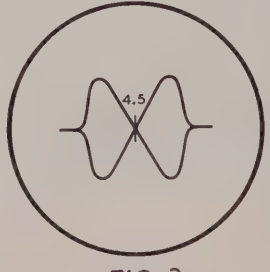


FIG. 3

ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket. Replace 6CB6, V6, if not already replaced.
Connect the battery bias as under video IF alignment.
The channel oscillator adjustment screws are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω carbon resistors	Across antenna terminals with 120Ω in each lead	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. amp. thru 47KΩ to point (A). Low side to chassis.	A12	Adjust to place sound marker in trap notch as in Fig. 4. Video marker should be at 55%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	

RF AND MIXER ALIGNMENT

The RF and mixer portion of this receiver has been properly aligned at the factory and is very stable.
Alignment of this portion should not be performed unless it is absolutely necessary.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
13.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. to point (E). Low side to chassis.	A24, A25 A26	Adjust for response curve similar to Fig. 5.
14.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig. 5. If markers fall below 70% on any channel make compromise adjustments of A24, A25 and A26 with channel switch set to that channel then recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.25MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			

UHF TUNER ALIGNMENT

The UHF tuner has been properly aligned at the factory. Alignment of this portion of the receiver should not be attempted in the field.

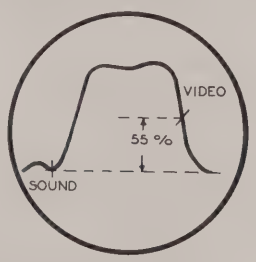


FIG. 4

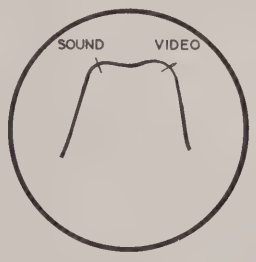


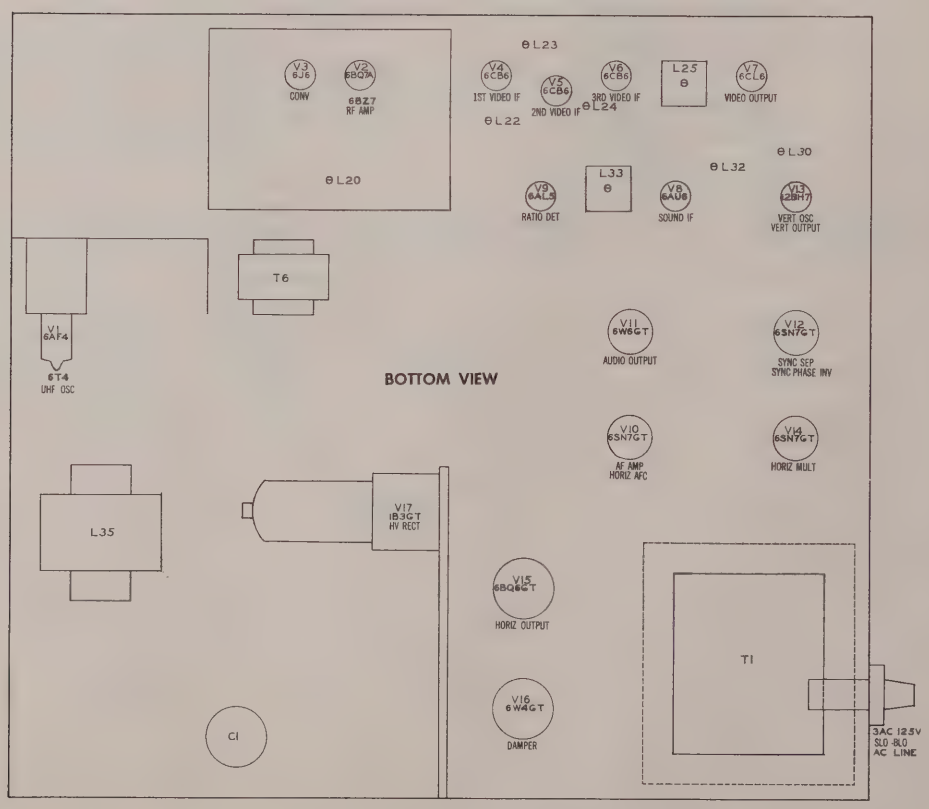
FIG. 5

SENTINEL MODELS 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

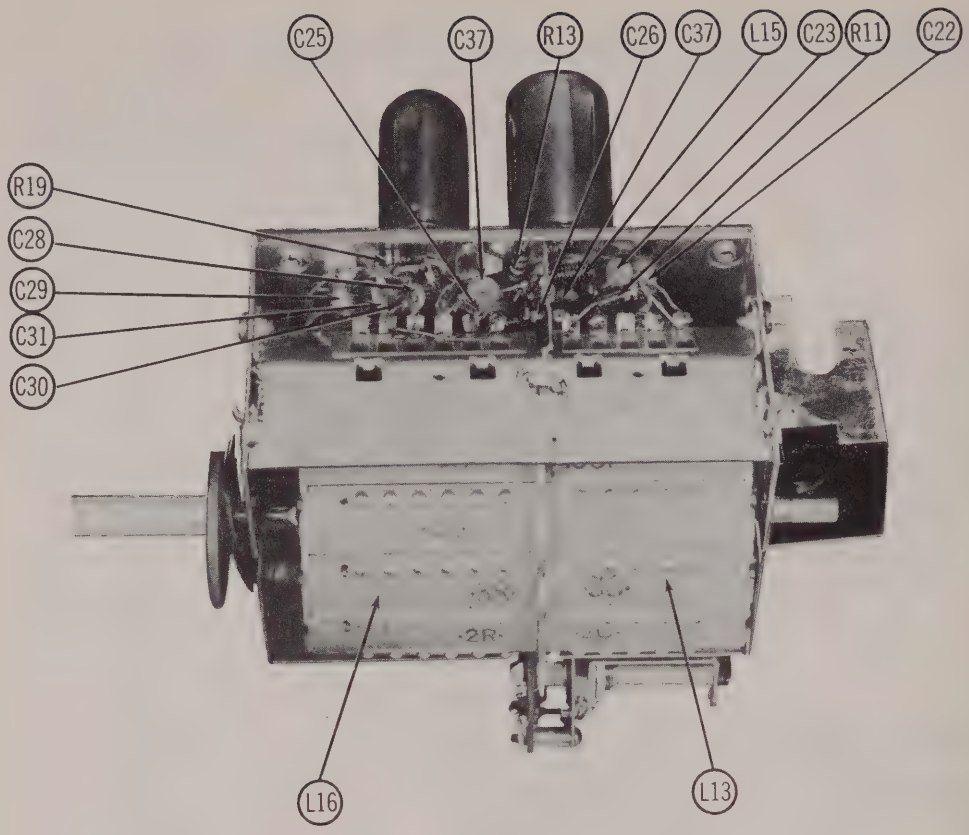
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	◓#3.1KΩ	12KΩ	.1Ω	.2Ω	.1Ω	12KΩ	◓#3.1KΩ		
V 2	6BQ7A	INF	■4Meg	0Ω	.2Ω	0Ω	†1.5KΩ	150KΩ	INF	0Ω
V 3	6J6	†23KΩ	#1KΩ	.2Ω	0Ω	235KΩ	10KΩ	0Ω		
V 4	6CB6	■1.5Meg	47Ω	0Ω	.1Ω	#1KΩ	#1KΩ	0Ω		
V 5	6CB6	■1.5Meg	56Ω	0Ω	.1Ω	#1KΩ	#1KΩ	0Ω		
V 6	6CB6	.1Ω	120Ω	0Ω	.1Ω	#1KΩ	#1KΩ	0Ω		
V 7	6CL6	1.5KΩ	470KΩ	†18KΩ	.1Ω	0Ω	†4KΩ	0Ω	†18KΩ	470KΩ
V 8	6AU6	3.2Ω	150Ω	0Ω	.1Ω	#10KΩ	#10KΩ	150Ω		
V 9	6AL5	INF	INF	.1Ω	0Ω	10KΩ	0Ω	10KΩ		
V 10	6SN7GT	150KΩ	†33KΩ	1.2KΩ	270KΩ	10KΩ	100KΩ	0Ω	.1Ω	
V 11	6W6GT	700KΩ	.1Ω	265Ω	65Ω	†33KΩ	INF	0Ω	100KΩ	
V 12	6SN7GT	2.2Meg	#680KΩ	0Ω	22KΩ	#10KΩ	2.2KΩ	0Ω	.1Ω	
V 13	12BH7	¶1.7Meg	600KΩ	225Ω	0Ω	0Ω	¶947Ω	¶1.7Meg	9KΩ	.1Ω
V 14	6SN7GT	4.9Meg	†7.8KΩ	1.2KΩ	150KΩ	†84KΩ	1.2KΩ	0Ω	.1Ω	
V 15	6BQ6GT	INF	.1Ω	INF	†15KΩ	470KΩ	†84KΩ	0Ω	0Ω	TOP CAP ¶21Ω
V 16	6W4GT	INF	INF	300KΩ	¶68Ω	†65Ω	10KΩ	¶20Ω	¶20Ω	
V 17	1B3GT	PINS 1 - 8 HAVE INFINITE RESISTANCE								TOP CAP ¶371Ω
V 18	5U4G	INF	50KΩ	INF	25Ω	INF	26Ω	INF	50KΩ	
V 19	21FP4A	0Ω	1.8KΩ	PIN 6 ¶180KΩ	PIN 10 ¶170KΩ	PIN 11 400KΩ	PIN 12 .1Ω			

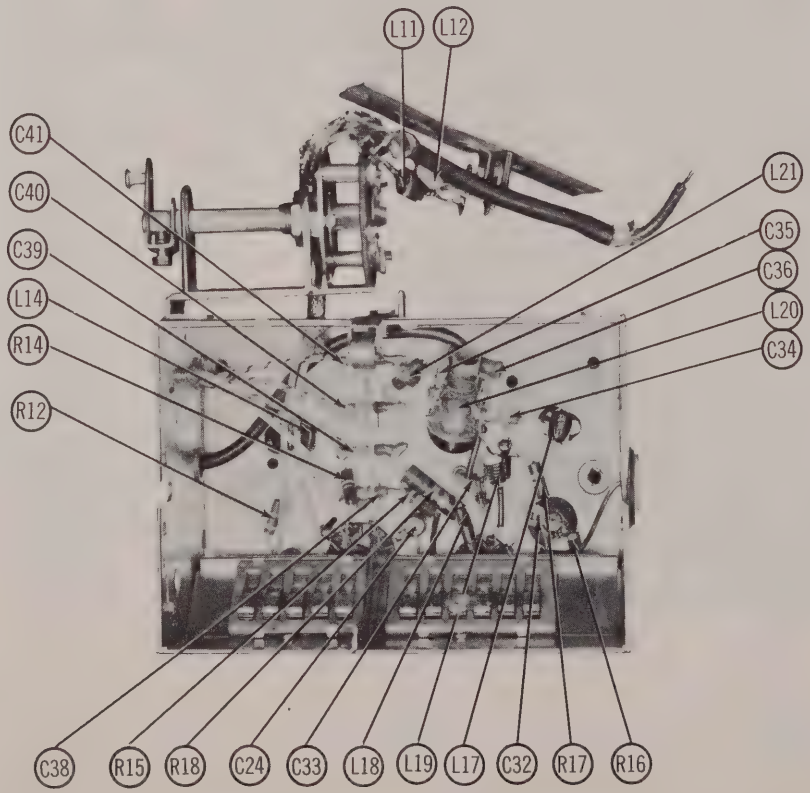
MEASURED FROM PIN 8 OF V11
† MEASURED FROM PIN 8 OF V18
¶ MEASURED FROM PIN 3 OF V16
◓ MEASURED WITH M11 IN UHF POSITION
■ MEASURED WITH M5 IN POSITION ONE



TUBE PLACEMENT CHART



VHF TUNER-RIGHT SIDE



VHF TUNER-BOTTOM VIEW

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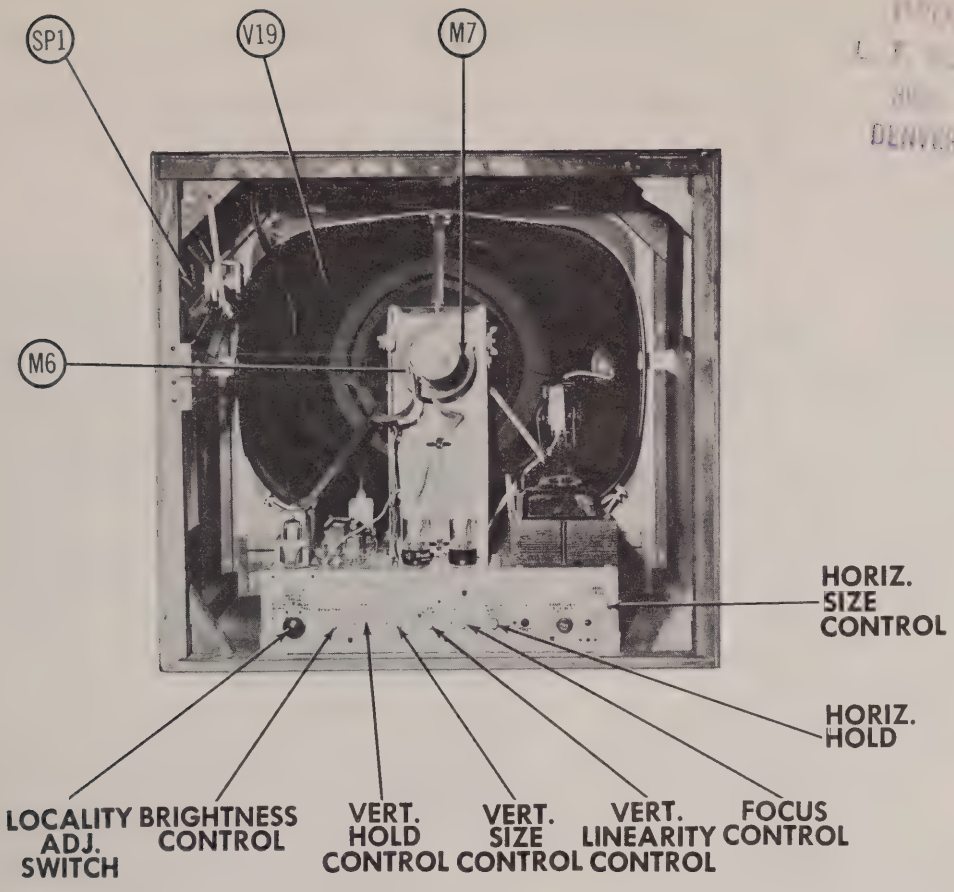
[illegible] ELATI ST.
DENVER, COLORADO



CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Adjust the horizontal hold slug (B1) to synchronize the picture horizontally.

Adjust the width slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

See "Loss of High Voltage."

INSUFFICIENT SWEEP

Check by substitution V14, V15, V16 and V18. Check adjustment B2. Check waveform W13.

If Satisfactory	If Unsatisfactory
Check C3B, C4, T3, T5A, C103 R86 and other associated components.	Check C98, C99, C102, R82, R85 and other associated components.

DRIVE LINES

Check by substitution V14, V15 and V16. Check adjustment B1. Check C98, C99, C102, C3B. C4. T3, T5A and other associated circuit components.

COMPRESSED LEFT SIDE

Check by substitution V14, V15, and V16. Check adjustments B1 and B2. Check T3, T5A and damper circuit components.

FOLDS

See "Drive Lines".

XMAS TREE EFFECT

Substitute V14. Check C97, C98 and other associated components.

VERTICAL

LOSS OF SWEEP

Substitute V13. Check waveform W7.

If Satisfactory	If Unsatisfactory
Check T4, T5B and other associated components.	Check C89, C90, R5, R77, T2 and other associated components.

INSUFFICIENT SWEEP

Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Substitute V13. Check R75, R6, C91 and other associated components.

COMPRESSED AT TOP

Substitute V13. Check T4, T5B and other associated components.

FOLDS

Substitute V13. Check components associated with this stage.

SYNC

LOSS OF VERTICAL AND HORIZONTAL SYNC

Substitute V12. Check associated circuit components.

LOSS OF VERTICAL SYNC-HORIZONTAL SYNC SATISFACTORY

Substitute V12 and V13. Check waveform W5.

If Satisfactory	If Unsatisfactory
Check components associated with the vertical oscillator.	Check C85, C86, R67, R68 and other associated with V12.

LOSS OF HORIZONTAL SYNC-VERTICAL SYNC SATISFACTORY

Substitute V10 and V14. Check associated components especially C97 and C98.

HORIZONTAL BENDING OR S-ING

Substitute V14 and V15. Check horizontal AFC filter network for component failure.

VIDEO

LOSS OF VIDEO

Check R41, R3, C65, picture tube and other associated components.

SOUND BARS (4.5MC BEAT)

Check local oscillator adjustment. Check adjustment A11. Check video IF alignment.

NEGATIVE PIX

Substitute V7. Check video detector crystal and assembly. Check AGC network for proper operation.

POOR CONTRAST

Substitute V7. Check video detector assembly, picture tube and other associated components.

SMEAR

Substitute V7. Check video detector crystal and assembly. Check C65, R3, R41, R38, C58, C57, picture tube and other associated components for change of value or failure.

WIDE BLACK BAR ACROSS PIX

Check V2, V3, V4, V5, V6 and V7 for heater to cathode leakage. In case of UHF check V1.

AUDIO

WEAK OR NO SOUND

Check by substitution V8, V9, V10 and V11. Check stages of V10A and V11 using an audio signal generator. Apply audio signal across R18.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V10A and V11.

BUZZ

Adjust A10 for minimum buzz. If buzz is still objectionable, substitute V9 and readjust A9 and A10. Check C70 and C6.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

POWER

DEAD SET

If filaments fail to light, check AC interlock assembly, fuse M1, switch on volume control and T1. If filaments light, check V18 and B+ filter and decoupling network components.

SMALL AND/OR DIM PIX

Substitute V18. Check B+ filter and decoupling components.

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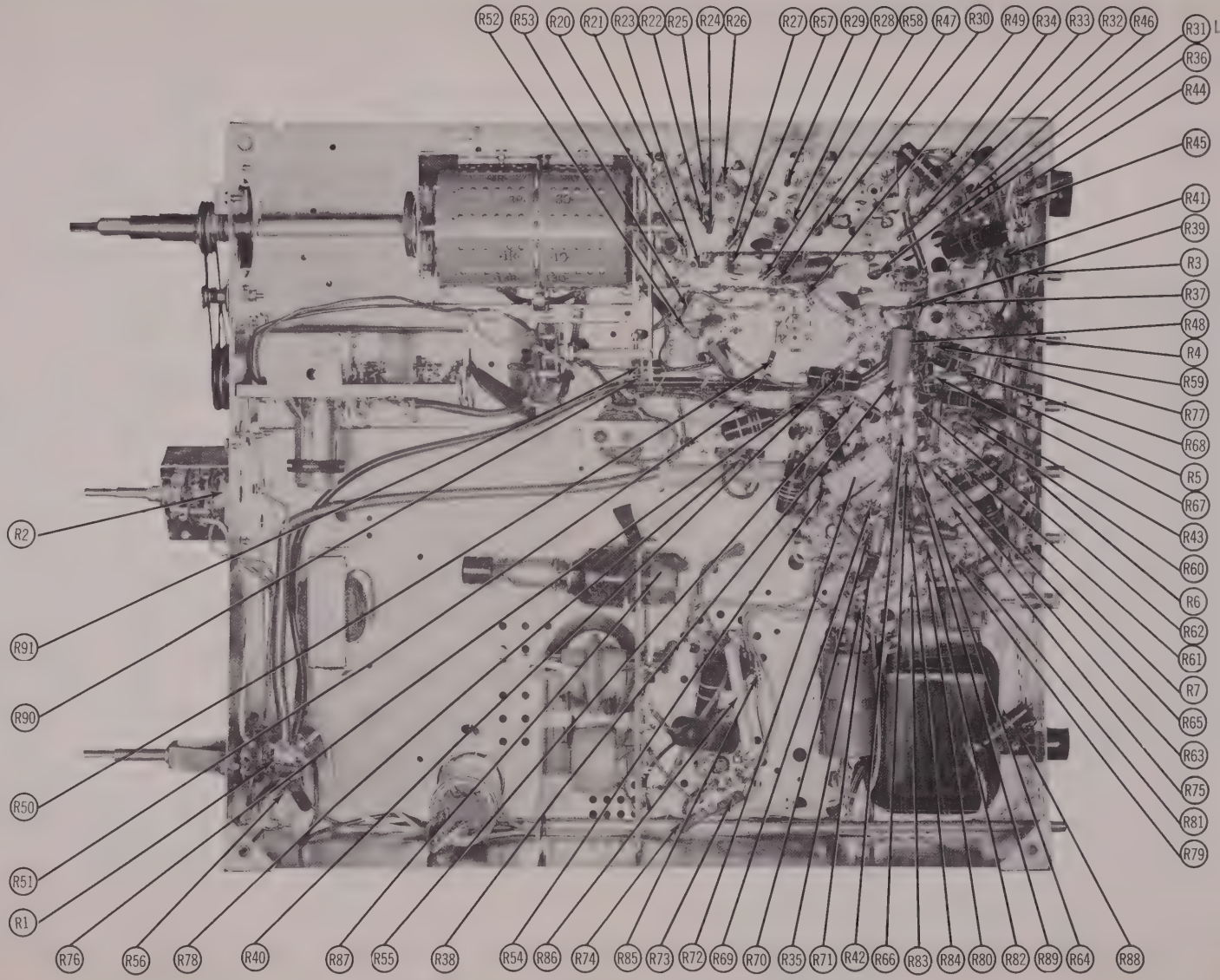
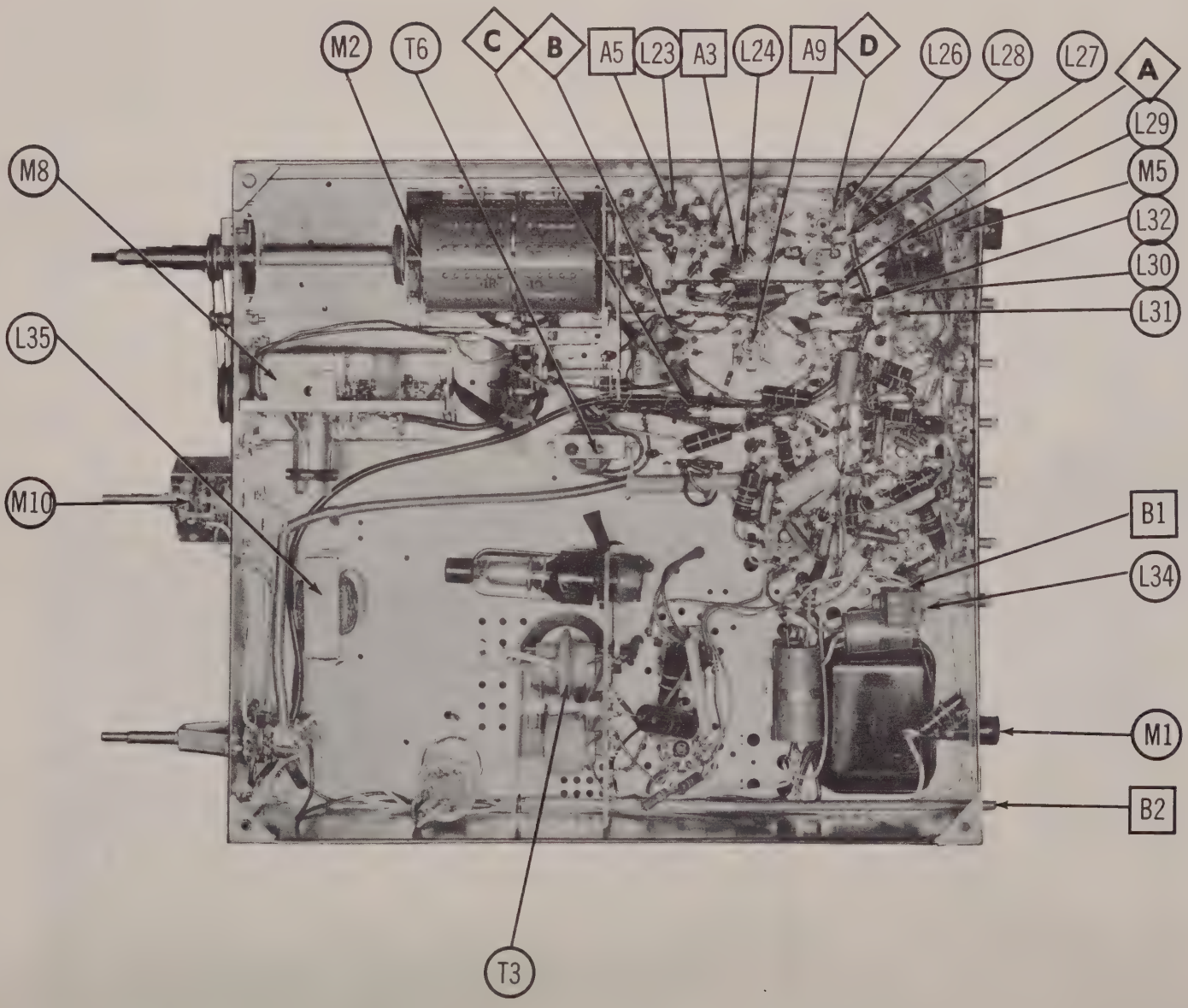
3924 MEADE ST.
DENVER, COLORADO



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR AND ALIGNMENT IDENTIFICATION

PROPERTY OF
U. S. NAVAL SHIP
3001 GRADE ST.
DENVER, COLORADO

PARTS LIST & DESCRIPTION

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	NOTES
		SENTINEL PART No.	STANDARD REPLACEMENT		
V1A	UHF Oscillator	6AF4	6AF4	7DK	Used on Models 520, 521, 522, 523, 525
B	UHF Oscillator	6T4	6T4	7DK	Used on Models 520, 521, 522, 523, 525
V2A	RF Amplifier	6BQ7A	6BQ7A	9AJ	
B	RF Amplifier	6BZ7	6BZ7	9AJ	
V3	Converter	6J6	6J6	7BF	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Output	6CL6	6CL6		
V8	Sound IF Amp.	6AU6	6AU6	7BK	
V9	Ratio Detector	6AL5	6AL5	6BT	
V10	AF Amplifier-Horiz. AFC	6SN7GT	6SN7GT	8BD	
V11	Audio Output	6W6GT	6W6GT	7S	
V12	Sync Separator-Sync Phase Inv.	6SN7GT	6SN7GT	8BD	
V13	Vert. Oscillator-Vert. Output	12BH7	12BH7	9A	
V14	Horiz. Mult.	6SN7GT	6SN7GT	8BD	
V15	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V16	Damper	6W4GT	6W4GT	4CG	
V17	HV Rectifier	1B3GT	1B3GT	3C	
V18	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA			RTMA BASE TYPE	NOTES
	SENTINEL PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.		
V19A	21FP4A	21FP4A 21FP4 ①	21FP4A 21FP4 ①	12C	① Circuit changesk necessary.
B	21YP4A	21YP4A		12C	
C	17HP4A	17HP4A 17HP4 ①	17HP4A 17HP4 ①	12C	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	SENTINEL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲40	350	25E65	AFH3-159		C118		FP375	TVL-3764	
B	■40	350								
C	▲100	200								
C2A	60	250	25E62	PRS250/30-30		BR6025		TC68	TVA-1613	Red
B	5	250		PRS250/4		BR425		TC50X	TVA-1501	
C3A	10	350	25E63	PRS350/10		BR1045A		TC62	TVA-1604	
B	30	200		PRS450/30		BR3025A		TC77	TVA-1510	Red
C4	20	450	25E64	PRS450/20		BR2045A		TC75	TVA-1709	
C5	10	50	25E66	PRS50/10		BR105		TC32	TVA-1304	
C6	10	50	25E66	PRS50/10		BR105		TC32	TVA-1304	
C7	1		M-211	SI1NP0	TCZ-1		NP0K-010		5TCCB-V1	
C8	1		M-216	SI1NP0	TCZ-1		NP0K-010		5TCCB-V1	
C9	2.7		M-213							
C10	.8-6.5		M-218							
C11	.25		M-217							
C12	.8-6.5		M-219							
C13	2.5		M-214							
C14	2.2		M-212	SI2.2NP0	TCZ-2.2		NP0K-2R2		5TCCB-V22	
C15	.68									
C16	3-10		M-220							
C17	6									
C18	68		M-221	SI68	D6-680		GP1K-680	UC-5468	5GA-Q68	
C19	68		M-223	SI68	D6-680		GP1K-680	UC-5468	5GA-Q68	
C20	250		M-215							
C21	800			BPD-0008	DD-102	TM5T8	801-001	DC-521	5HK-D1	
C22	3-9		31B-167		829-10					
C23	3		CD8C-030C	SI3NP0	TCZ-3		NP0K-030		5TCCB-V3	
C24	.5-3		31B-206		829-3			CT565A		
C25	68			SI68	D6-680		GP1K-680	UC-5468	5GA-Q68	
C26	800		31B-611	EF-001	MFT-1000				503C-D1	
C27	1.5		CD8C1R5M	SI1.5NP0	TCZ-1.5		NP0K-1R5	ZT-5515	5TCCB-V15	
C28	47		CD8Q-470K	BPD-000047	D6-470		GP1K-470	UC-5447	5GA-Q47	
C29	.5-3		31B-206		829-3			CT565A		
C30	10		CD10C-100K	SI10NP0	TCZ-10		NP0K-100	ZT-541	5TCC-Q1	
C31	5		CD8UA-050C							
C32	1000		CD8X-102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C33	1000		CD8X-102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C34	6.8		13L8C6R8C	SI6.8NP0	TCZ-6.8		NP0K-6R8	ZT-5568	5TCCB-V68	
C35	120		13L8D121K	BPD-00012	D6-121	TM5T12	GP2K-121	UC-5312	5GA-T12	
C36	100		13XR1-30U101J	SI100N750	TCN-100		N750L-101	NT-531	5TCU-T1	
C37	1000		CD8X-102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C38	800		CU-18A31B-611	EF-001	MFT-1000				503C-D1	
C39	800		CU-18A31B-611	EF-001	MFT-1000				503C-D1	
C40	800		CU-18A31B-611	EF-001	MFT-1000				503C-D1	
C41	800		CU-18A31B-611	EF-001	MFT-1000				503C-D1	
C42	1000		23E2025-3	BPD-001	DD-102	TM5D1	811-001	DC-521	5HK-D1	
C43	470		23E2027-14	SI470	D6-471		GP1K-471	UC-5447	5GA-T47	
C44	1000		23E2025-3	BPD-001	DD-102	TM5D1	811-001	DC-521	5HK-D1	
C45	15			SI15	D6-150		GP1K-150	UC-5415	5GA-Q15	
C46	1000		23E2025-3	BPD-001	DD-102	TM5D1	811-001	DC-521	5HK-D1	
C47	470		23E2027-14	SI470	D6-471		GP1K-471	UC-5447	5GA-T47	
C48	1000		23E2025-3	BPD-001	DD-102	TM5D1	811-001	DC-521	5HK-D1	
C49	15			SI15NP0	TCZ-15				5TCC-Q15	
C50	680		23E2027-11	SI680	D6-681		GP2K-681	UC-5368	5GA-T68	
C51	680		23E2027-11	SI680	D6-681		GP2K-681	UC-5368	5GA-T68	
C52	1000		23E2025-3	BPD-001	DD-102	TM5D1	811-001	DC-521	5HK-D1	
C53	3		23E20	SI3NP0			NP0K-030	ZT-553		
C54	.25	100	23E123	P288-25		PJ2P25		PT4025	2TM-P25	
C55	5000		23E2025	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

PARTS LIST & DESCRIPTION (continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA SENTINEL PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C56	5000		23E2025	BPD-005	DD-502	TMSD5	811-005	DC-525	5HK-D5	
C57	.1	200	23E3216	P288-1	DF-104	PTE4P1		PT401	2TM-P1	
C58	5000		23E2025	BPD-005	DD-502	TMSD5	811-005	DC-525	5HK-D5	
C59	470		23E2027-14	SI470	D6-471		GPIK-471	UC-5447	5GA-T47	
C60	.0022	400	23E3406	P488-0022	D6-322	PTE6D22	GP2-333-222	PT6223	6TM-D22	Note 1
C61	1000		23E2027-12	SI1000	D6-102	TMSD1	GP2L-102	UC-521	5HK-D1	Note 1
C62	.0022	400	23E3406	P688-0022	D6-322	PTE6D22	GP2-333-222	PT6223	6TM-D22	Note 1
C63	1000		23E2027-12	SI1000	D6-102	TMSD1	GP2L-102	UC-521	5HK-D1	Note 1
C64	30		23E23	SI30NP0	TCZ-30					
C65	.1	400	23E3416	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C66	2.2		23E21	SI2.2NP0	TCZ-2.2		NP0K-2R2		5TCCB-V22	
C67	30		23E23	SI30NP0	TCZ-30		NP0K-300	ZT-542	5TCC-Q3	
C68	5000		23E2025	BPD-005	DD-502	TMSD5	811-005	DC-525	5HK-D5	
C69	5000		23E2025	BPD-005	DD-502	TMSD5	811-005	DC-525	5HK-D5	
C70	1000		23E2025-3	BPD-001	DD-102	TMSD1	811-001	DC-521	5HK-D1	
C71	1000		23E2025-3	BPD-001	DD-102	TMSD1	811-001	DC-521	5HK-D1	
C72	470	500	23E3500-40	1469-0005		5R5T5		MCB245	M8-35	
C73	1000		23E3027-9	SI1000	D6-102	TMSD1	GP2L-102	UC-521	5HK-D1	
C74	5000		23E2025	BPD-005	DD-502	TMSD5	811-005	DC-525	5HK-D5	
C75	.039	400	23E3423							Note 1
C76	.0033	400	23E3407	P688-0033	D6-332	PTE6D33	GP2-333-332	PT6233	6TM-D33	
C77	.0047	400	23E3408	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	Note 2
C78	.0047	600	23E3608	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C79	5000		23E2025	BPD-005	DD-502	TM5D5	811-005	DC-525	5HK-D5	
C80	150		23E2027-10	SI150	D6-151	TM5T15	GP2K-151	UC-5315	5GA-T15	
C81	.0047	600	23E3608	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C82	30		23E23	SI30	D6-300		GP1K-300	UC-543	5GA-Q3	
C83	.047	400	23E3414	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C84	470	500	23E3500-40	1469-0005		5R5T5		MCB245	M8-35	
C85	.0047	400	23E3408	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C86	.0047	400	23E3408	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C87	.01	400	23E3434	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C88	.0047	400	23E3408	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C89	.047	400	23E3434	P488-047		PTE4S47		PT4147	4TM-S47	
C90	.047	400	23E3414	P488-047		PTE4S47		PT4147	4TM-S47	
C91	5000		23E2025	BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C92	470	500	23E3500-40	1469-0005		5R5T5		MCB245	M8-35	
C93	.01	400	23E3410	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C94	47		23E2030-15	SI47	D6-470		GP1K-470	UC-5447	5GA-Q47	
C95	.0033	400	23E3407	P688-0033	D6-332	PTE6D33	GP2-333-332	PT6233	6TM-D33	
C96	.01	400	23E3410	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C97	3900	500	23E2033-4	1464-004		1DB5DM		MCB463	M5-34	
C98	390	500	23E3500-39	1469-0004		5R5T4		MCB243	M5-34	
C99	680	500	23E3500-85	1478-0007		5R5T7			M5-37	
C100	.01	400	23E3410	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C101	470	500	23E3500-40	1469-0005		5R5T5		MCB245	M5-35	
C102	5000		23E2025	BPD-005	MD-502	TM5D5	811-005	DC-525	5HK-D5	
C103	.1	400	23E3416	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C104	.1	600	23E3616	P688-1	DF-104	PTE6P1		PT601	6TM-P1	
C105	47	2000	23E2025-5	HVD30-00004				MCL447	20GA-Q47	
C106	.001	400	23E3404	P488-001	D6-102	PTE6D1	GP2L-102	PT621	6TM-D1	
C107	.01	600	23E3610	689ZX-01		PJ6S1		PT611	6TM-S1	
C108	.01	600	23E3610	689ZX-01		PJ6S1		PT611	6TM-S1	

Note 1. Not used in Models 500, 510, 520.
Note 2 Models 500, 510, 520 use .01MFD in this application (part #23E3410).

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA SENTINEL PART No	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1500Ω	½	28E99	*QJ-482				Contrast tapped Ⓐ 187Ω & 375Ω (Panel)
B	1Meg	½	Not Req.					Volume tapped Ⓐ 300KΩ (Rear)
R2	1Meg	½	28E100					Tone & Switch - Note 1
R3A	5Meg with 100KΩ stop	½	28E87	Q11-141	AG-85-S	AB-87	SU-87	Brightness - Note 2
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R3A
R4A	850KΩ with 100KΩ stop	½	28E90	Q11-133	AG-58-S	AB-59	SU-54	Vert. Hold - Note 3
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R4A
R5A	5Meg with 1Meg stop	½	28E88	Q11-141	AG-85-S	AB-87	SU-87	Vert.Size - Note 4
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R5B
R6A	750Ω	½	28E86	Q11-105	AG-8-S	AB-5	U-4	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7A	1Meg	½	28E89	Q11-137	AG-81-S	AB-89	SU-54	Focus
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R7A

Note 1. Not used in Model 1U500, 1U510 and 1U520.
Note 2. Connect a 100KΩ resistor in series with the left hand terminal of the control and the lead connecting to the same terminal of the original control. (Control viewed from shaft end, terminal down).
Note 3. Connect a 330KΩ resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (Control viewed from shaft end, terminals down)
Note 4. Connect a 1Meg resistor in series with the right hand terminal of the control and the lead connecting to the same terminal of the original control (Control viewed from shaft end, terminals down).
* CONCENTRIKIT EQUIVALENT KIT K-2 BASE ELEMENTS & SHAFTS B17-108 & P1-200 (Panel)
B13-133 & R1-223 (Rear) & SWITCH 76-1.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	REPLACEMENT DATA SENTINEL Part No.	IRC Part No.	NOTES
R8	470KΩ	½		BTS-470K	
R9	470KΩ	½		BTS-470K	
R10	12KΩ	½		BTS-12K	
R11	15KΩ	½		BTS-15K	
R12	47KΩ	½		BTS-47K	
R13	330KΩ	½		BTS-330K	
R14	220KΩ	½		BTS-220K	
R15	470Ω	½		BTS-470	
R16	15KΩ	½		BTS-15K	
R17	220KΩ	½		BTS-220K	
R18	22KΩ	1		BTA-22K	
R19	10KΩ	½		BTS-10K	
R20	22KΩ	½	27E223-2	BTS-22K	
R21	47Ω	½	27E470-2	BTS-47	
R22	1000Ω	½	27E102-2	BTS-1000	
R23	1000Ω	½	27E102-2	BTS-1000	
R24	1000Ω	½	27E102-2	BTS-1000	
R25	18KΩ	½	27E183-2	BTS-18K	
R26	56Ω	½	27E560-2	BTS-56	
R27	1000Ω	½	27E102-2	BTS-1000	
R28	18KΩ	½	27E183-2	BTS-18K	
R29	120Ω	½	27E121-2	BTS-120	
R30	1000Ω	½	27E102-2	BTS-1000	
R31	1.5Meg	½	27E155-2	BTS-1.5Meg	
R32	5600Ω 5%	½	27E1009-8	BTS-5600 5%	
R33	470KΩ	½	27E474-2	BTS-470K	
R34	270Ω	½	27E271-2	BTS-270	
R35	18KΩ	2	27E183-5	BTB-18K	
R36	5600Ω 5%	½	27E1009-2	BTS-5600 5%	
R37	1800Ω	½	27E182-2	BTS-1800	
R38	4000Ω	5	27E1032	1 3/4A-4000	
R39	10KΩ	½	27E103-2	BTS-10K	
R40	1800Ω	½	27E182-2	BTS-1800	
R41	100KΩ	½	27E1009-10	BTS-100K	
R42	470KΩ	½	27E474-2	BTS-470K	
R43	220KΩ	½	27E224-2	BTS-220K	
R44	2.2Meg	½	27E225-2	BTS-2.2Meg	
R45	680KΩ	½	27E684-2	BTS-680K	
R46	10KΩ	1	27E103-3	BTA-10K	
R47	22KΩ	½		BTS-22K	
R48	150Ω	½	27E151-2	BTS-150	
R49	10KΩ	½	27E103-2	BTS-10K	
R50	470Ω	½	27E471-2	BTS-470	
R51	33KΩ	½	27E333-2	BTS-33K	
R52	10K 5%	½	27E1009-35	BTS-10K 5%	
R53	10K 5%	½	27E1009-35	BTS-10K 5%	
R54	1200Ω	½	27E122-2	BTS-1200	
R55	33KΩ	1	27E333-3	BTA-33K	
R56	68KΩ	½	27E683-2	BTS-68K	
R57	1000Ω	½	27E102-2	BTS-1000	
R58	1000Ω	½	27E102-2	BTS-1000	
R59	470KΩ	½	27E474-2	BTS-470K	
R60	2.2Meg	½	27E225-2	BTS-2 2Meg	
R61	680KΩ	½	27E684-2	BTS-680K	
R62	2200Ω	½	27E222-2	BTS-2200	
R63	22KΩ	½	27E223-2	BTS-22K	
R64	6800Ω	½	27E682-2	BTS-6800	
R65	560KΩ	½	27E1009-11	BTS-560K	
R66	3300Ω	½	27E332-2	BTS-3300	
R67	22KΩ	½	27E223-2	BTS-22K	
R68	10KΩ	½	27E103-2	BTS-10K	
R69	82KΩ	½	27E823-2	BTS-82K	
R70	82KΩ	½	27E823-2	BTS-82K	
R71	100KΩ	½	27E1009-10	BTS-100K	
R72	33KΩ	1	27E333-2	BTS-33K	
R73	6800Ω	1	27E682-3	BTA-6800	
R74	6800Ω	1	27E682-3	BTA-6800	
R75	8700Ω	5	27E1016-20	1 3/4A-9000	
R76	1800Ω	½	27E182-2	BTS-1800	
R77	2.2Meg	½	27E225-2	BTS-2.2Meg	
R78	120Ω	½	27E121-2	BTS-120	
R79	1200Ω	½	27E122-2	BTS-1200	
R80	150KΩ	½	27E1009-46	BTS-150K	
R81	5600 5%	½	27E1009-8	BTS-5600 5%	
R82	82KΩ	½	27E823-2	BTS-82K	
R83	2200Ω	½	27E222-2	BTS-2200	
R84	8200Ω 5%	½	27E1009-22	BTS-8200 5%	
R85	470KΩ	½	27E474-2	BTS-470K	
R86	15KΩ	5	27E1016-13	1 3/4A-15,000	
R87	2.2Ω	5	23E1015-2		
R88	220KΩ	½	27E224-2	BTS-220K	
R89	4.7Meg	½		BTS-4.7Meg	
R90	15KΩ	½		BTS-15K	
R91	3300	2		BTB-3300	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC. 1	RATING SEC. 2	RATING SEC. 3	REPLACEMENT DATA SENTINEL Part No.	STANCOR Part No.	MERIT Part No.	CHICAGO Part No.	TRIAD Part No.	RCA TYPE No.
T1	117VAC Ⓖ 1.56A	550VCT 220ADC	5VAC Ⓖ 3A	6.3VAC Ⓖ 1.2A SEC. 4 6.3VAC Ⓖ 8.6A	22E47 22E74 ①			TP-190		

① Alternate power transformer.

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	REPLACEMENT DATA SENTINEL Part No.	STANCOR Part No.	MERIT Part No.	CHICAGO Part No.	TRIAD Part No.	RCA TYPE No.	NOTES
T2	52Ω	225Ω	22E70	A-8125	A-3003	TSO-5	A-97X		Vert. Osc. Trans.
T3	350Ω	4.1Ω	22E75-1						Horiz. Output Trans.
	tap Ⓓ	SEC. 2 6Ω	22E75 ①						
	7.5Ω, 25.5Ω, 25Ω, 49Ω								
T4	940Ω tap Ⓓ		22E72	A-8140 ② ③	A-3081 ④ ⑤	TSO-8 ⑥ ⑦	A-103X ⑧ ⑨		Vert. Output Trans.
	1.1Ω								
T5A	43Ω		20E788-2	DY-10A ⑩ ⑦ ⑤	MDF-74 ⑦ ⑤ ⑫	TY-10 ⑦ ⑤	Y-20 ⑦ ⑤ ⑯	214D1 ⑦ ⑤	Horiz. Deflection Coils
B	3.6Ω		62E6 ⑤						Vert. Deflection Coils

① Alternate horizontal output transformers.
② Drill new mounting holes.
③ Connect as auto transformer
④ Drill one new mounting hole .
⑤ Use 50 to 1 turns ratio.
⑥ Yoke cover and positioning device, part of 20E788-2.
⑦ Connect jumper from terminal #1 to terminal #8 or #5.
⑧ Use original yoke cover and positioning device.
⑨ Use original horizontal deflection coil network if necessary.
⑩ Use original deflection coil network.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	REPLACEMENT DATA SENTINEL Part No.	STANCOR Part No.	MERIT Part No.	CHICAGO Part No.	TRIAD Part No.	NOTES
T6	2.15KΩ	2.6Ω	200Ω	.6Ω	22E71	A-3876	A-2926	RO-2	S-2X	

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V. C. IMP.	REPLACEMENT DATA SENTINEL Part No.	VIKING Part No.	OUAM Part No.	NOTES
SP1A	6"	PM	2.6Ω	1E49	676	6A1	① Used in models 1U 512, 1U513, 1U515, 1U522, 1U523, and 1U525.
B	10"	PM	2.6Ω	1E43-2 ①	1071I	10A31	

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	REPLACEMENT DATA SENTINEL Part No.	MEISSNER Part No.	MERIT Part No.	MILLER Part No.	NOTES
L1A	UHF Coil	0Ω						
B	UHF Mixer Coil	0Ω						
C	UHF Osc. Coil	0Ω						
L2	UHF Ant. Coil end	0Ω						
	Inductor	0Ω						
L3	UHF Mixer Coil end	0Ω						
L4	UHF Osc. coil end inductor	0Ω						
L5	Cathode choke	0Ω		M-226				
L6	Fil. choke	.2Ω		M-227				
L7	Fil. choke	.2Ω		M-228				
L8	RF choke	0Ω		M-225				
L9	UHF IF Coupling	0Ω		M-224				
L10	UHF IF Output coil	0Ω	0Ω	M-229				
L11	IF trap	0Ω		20E-889				Wound on 68 Microhenries cap.
L12	IF trap	0Ω		20E-890				Wound on 68 Microhenries cap.
L13A	VHF Ant. coil	0ΩCT	0Ω	31M-012-2Q				Channel 2
B	VHF Ant. coil	0ΩCT	0Ω	31-M-012-3Q				Channel 3
C	VHF Ant. coil	0ΩCT	0Ω	31M-012-4Q				Channel 4
D	VHF Ant. coil	0ΩCT	0Ω	31M-012-5Q				Channel 5
E	VHF Ant. coil	0ΩCT	0Ω	31M-012-6Q				Channel 6
F	VHF Ant. coil	0ΩCT	0Ω	31M-012-7Q				Channel 7
G	VHF Ant. coil	0ΩCT	0Ω	31M-012-8Q				Channel 8
H	VHF Ant. coil	0ΩCT	0Ω	31M-012-9Q				Channel 9
I	VHF Ant. coil	0ΩCT	0Ω	31M-012-10Q				Channel 10
J	VHF Ant. coil	0ΩCT	0Ω	31M-012-11Q				Channel 11
K	VHF Ant. coil	0ΩCT	0Ω	31M-012-12Q				Channel 12
L	VHF Ant. coil	0ΩCT	0Ω	31M-012-13Q				Channel 13
M	UHF Ant. strip	0Ω	0Ω	31M-113-1Q				40MC
L14	Fil. Choke	0Ω		34A-546				
L15	Neutr. coil	0Ω		31B-629				
L16A	VHF RF, mixer grid & Osc. coil	0Ω		31M-112-2R				Channel 2
B	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-3R				Channel 3
C	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-4R				Channel 4
D	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-5R				Channel 5
E	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-6R				Channel 6
F	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-7R				Channel 7
G	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-8R				Channel 8
H	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-9R				Channel 9
I	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-10R				Channel 10
J	VHF RF, Mixer grid & Osc. coil			31M-112-11R				Channel 11
K	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-12R				Channel 12
L	VHF RF, Mixer grid & Osc. coil	0Ω		31M-112-13R				Channel 13
M	UHF RF strip	0Ω		31M-113O1R				40MC, Includes resistors & capacitor
L17	Fil. Choke	0Ω		34A-575				
L18	Feedback coil	1.3Ω		31B-230				
L19	RF Choke	0Ω		31B-638-1				
L20	Conv. plate coil	0Ω		31B-642				
L21	RF Choke	1.2Ω		34A-680				
L22	1st Video IF	0Ω		20E857				
L23	2nd Video IF	.1Ω	.1Ω	20E858				Includes trap
L24	3rd Video IF	.1Ω	.1Ω	20E859				Includes trap
L25	4th Video IF	.1Ω	.1Ω	20E860				Includes 1N60 Crystal detector (Part # 95E1), 5MMF capacitor, & Series Peak. coil.
L26	Series Peak. coil	2.4Ω		20E883			4612	12 Microhenries
L27	Shunt. Peak. coil	15Ω		20E363-19	19-1923		4648	390 Microhenries
L28	Cathode Choke	1.2Ω		20E93	19-3001	TV-189	4604	1.5 Microhenries; IRC Part # CLA

PARTS LIST AND DESCRIPTIONS (Continued)

COILS (cont)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	SENTINEL PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L29	Series Peak. Coil	11Ω		20E363-25	19-3250	TV-185	6181	270Microhenries
L30	4. 5MC Trap	3. 2Ω		20E785	20-1004	TV-151	1470	
L31	Shunt. Peak. coil	19Ω		20E363-26	19-3860			800 Microhenries
L32	Sound IF	3. 2Ω		20E785	20-1005	TV-151	1469	
L33	Ratio Det.	3. 8Ω	. 7ΩCT	20E783	17-1033	TV-110	1468	Tentiary winding=. 45Ω
L34	Horiz. Osc.	95Ω		20E831	19-1576	TV-163	6210	

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	SENTINEL PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
L35	. 220A	66. 4Ω	1. 8HY	22E73	C-2325 ①	C-2996 ①	TR-1733 ①	C-21X ①

① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			SENTINAL PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	3A	40E8-10	55E57	313003. (3AG S/B-3A)	342001	MDL3	HKP

MISCELLANEOUS

ITEM No.	PART NAME	SENTINEL PART No.	NOTES
M2	Tuner	20E863	VHF Models 520, 521, 522, 523, 525
M3	Tuner	20E856	VHF Models 500, 510, 511, 512, 513, 515
M4	Crystal	95E1	1N60 Video Detector
M5	Switch	29E30	Locality Adjuster (wafer-rotary)
M6	Centering Magnet	62E6	
M7	Ion Trap	13E174-4 or 6	
M8	Tuner	20E867	UHF Models 520, 521, 522, 523, 525
M9	Crystal		UHF Mixer 1N82 Models 520, 521, 522, 523, 525
M10	Switch	28E100	"Hi'Lite" control All Models except 500, 510, 520 (wafer-rotary)
M11	Switch	29E31	VHF-UHF Selector mounts on rear of VHF tuner
	Knob	37E83	Off/on Volume Models 500, 510, 520, 511, 512, 513, 515, 521, 522, 523, 525
	Knob	37E84	Contrast Models 500, 510, 520, 511, 512, 513, 515, 521, 522, 523, 525
	Knob	37E84-3	Fine tuning Models 500, 510, 520, 511, 512, 513, 515, 521, 522, 523, 525
	Knob	37E87	Channel Selector Models 500, 510, 511, 512, 513, 515
	Knob	37E83-3	VHF Selector Models 520, 521, 522, 523, 525
	Knob	37E88	UHF Selector Models 520, 521, 522, 523, 525
	Knob	37E83-2	Off/On Volume (Blond cabinet)
	Knob	37E83-4	VHF Selector (Blond) Models 521, 522, 523, 525
	Knob	37E85	Tone
	Knob	37E85-2	Tone (Blond cabinet)
	Knob	37E86	"Hi-lite"
	Knob	37E86-2	"Hi-lite" (Blond cabinet)
	Knob	37E87-2	VHF Selector (Blond) Models 511, 512, 513, 515
	Knob	37E88-2	UHF Selector (Blond) Models 521, 522, 523, 525
	Cabinet Back	20E774	Model 500
	Cabinet Back	20E774-9	Model 510
	Cabinet Back	20E774-11	Model 520
	Cabinet Back	20E774-5	Models 511, 512, 513, 515
	Cabinet Back	20E774-12	Model 521, 522, 523, 525
	Safety Glass	9E45-3	Model 500
	Safety Glass	9E45	All other Models.
	Mask	36E84-3	Model 500
	Mask	36E93	Models 510, 520
	Mask	36E83-4	All other Models.

MODELS 1U500, 1U510, 1U511, 1U512, 1U513, 1U515, 1U520, 1U521, 1U522, 1U523, 1U525

L. F. SCHWEIZER
3W1 MEADE ST.
DENVER, COLORADO

ALTERNATE TUNER SCHEMATIC

ALTERNATE TUNER PART NO. 20E856 USED IN MODELS 500,510,511,512,513 & 515

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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TROUBLE SHOOTING AIDS (cont)

3924 MEADE ST.
DENVER, COLORADO

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V14, V15, V16, and V17. Check waveform W13.

If Satisfactory	If Unsatisfactory
Check T3, T5A, R87 and other associated components.	Check C99, C102, R85, R82 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V17, V16, V15, V14 and V18. Proceed as outlines under "Loss of High Voltage."

BLOOMING

Check by substitution V17, V16, V15, V14 and V18. Check R87, T3, T5A, picture tube and other associated circuit components.

GENERAL

RASTER SOUND NO PIX

See "Loss of Video".

RASTER NO SOUND NO PIX

Check by substitution V2, V3, V4, V5, V6 and V7. Check UHF-VHF switch. Check other associated circuit components.

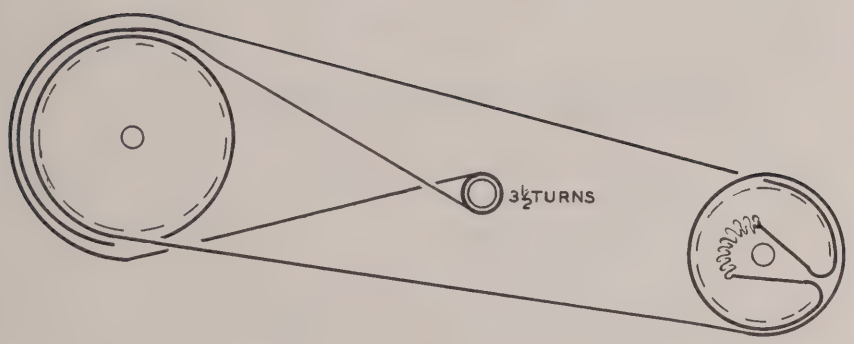
NO RASTER NO SOUND

See "Dead Set".

INTERMITTENT STREAKS

Check video signal for interference pulses. Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this receiving equiptment.



UHF DIAL CORD STRINGING

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by bemoving the channel selector and fine tuning knobs.

PICTURE TUBE SAFETY GLASS CLEANING

For picture tube safety glass cleaning, it is necessary to remove chassis. (See disassembly instructions).

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from rear panel of chassis. Adjust the horizontal hold slug (L34) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate sound IF detector, adjust the ratio detector secondary (L33) located on top of chassis. (See tube placement chart).

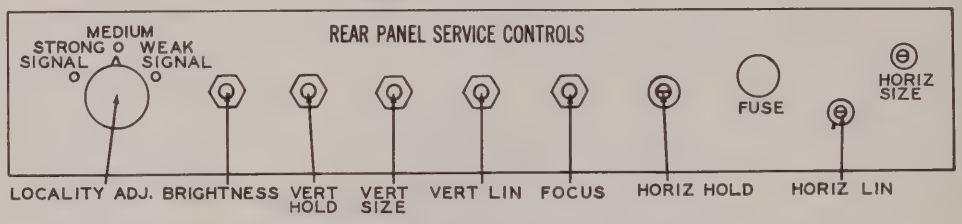
FUSES

One fuse is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting two magnetic rings around the neck of the picture tube, located flush against the deflection yoke. Rotate the two rings around the neck of the tube until the picture is properly centered.

SERVICE ADJUSTMENT LOCATION



DISASSEMBLY INSTRUCTIONS

Remove 5 push on type control knobs from front panel.

Remove 9 wood screws. Remove rear cover.

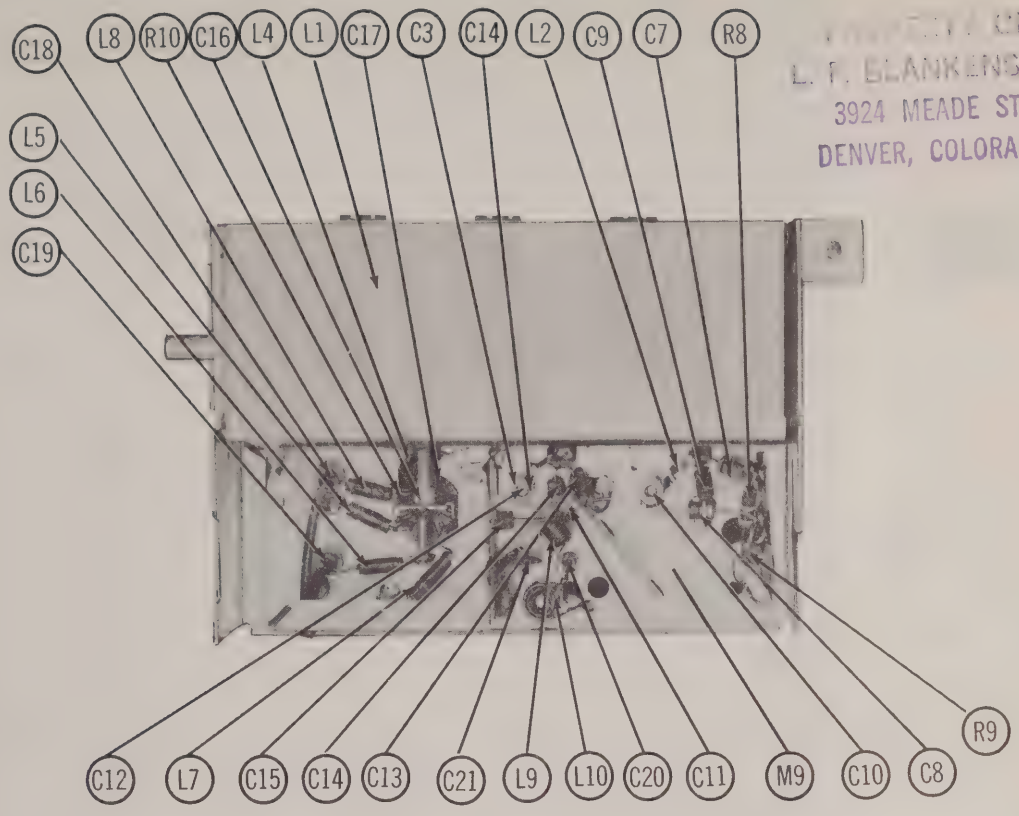
Disconnect VHF & UHF built in antenna.

Remove 4 wood screws. Remove VHF & UHF antenna brackets.

Disconnect speaker. Remove 4 speaker nuts. Remove speaker.

Remove 2 wood screws from CRT bracket (one on each side).

Remove 4 chassis bolts. Remove chassis.

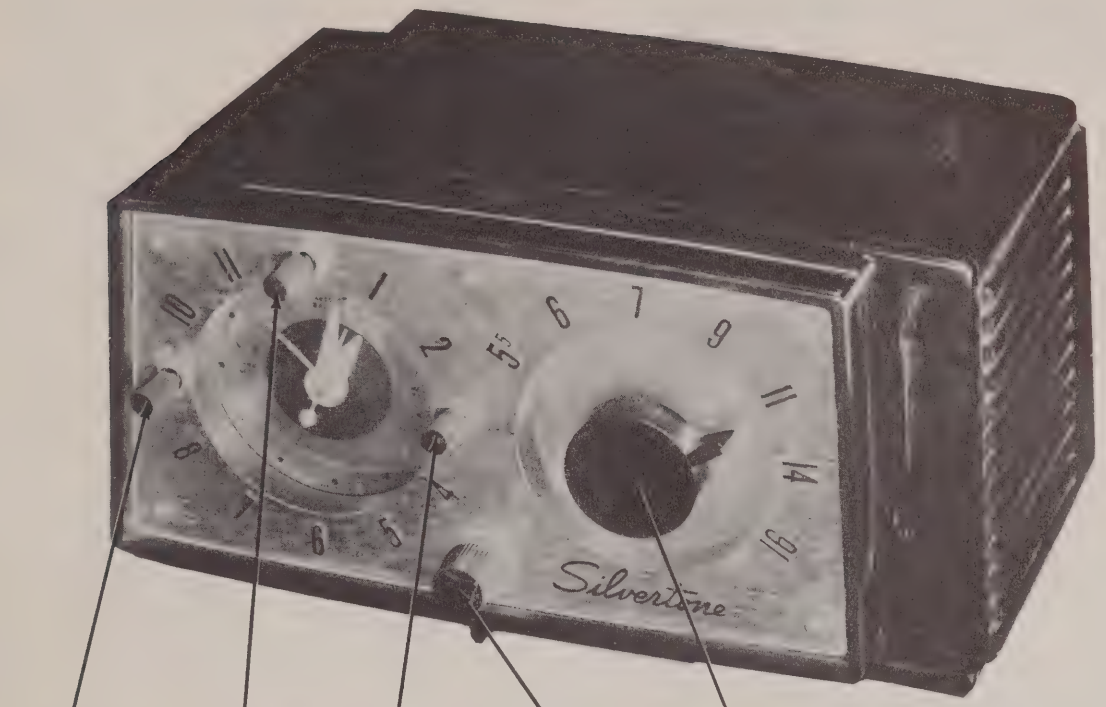


PROPERTY OF
L. T. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

UHF TUNER

PROPERTY OF
L. F. BLANKENSHIP
3924 MEADE ST.
DENVER, COLORADO

SILVERTONE MODELS
3007, 3008, 3009, (Ch. 757.120)



SILVERTONE MODELS
3007, 3008, 3009, (Ch. 757.120)

TRADE NAME	Silvertone Models 3007, 3008, 3009 (Ch. 757.120)
SUPPLIER	Sears Roebuck & Co., 925 S. Homan, Chicago, Ill.
TYPE SET	AC Operated AM Superheterodyne Receiver with Electric Clock
TUBES (Four)	Types 12BE6 Conv., 12AV6 Det.-AVC-AF Amp., 50L6GT Audio Output, 35W4 Rectifier
POWER SUPPLY	105-120 Volts AC-60 Cycles — RATING .27 Amp. @ 117 Volts AC
TUNING RANGE—BROADCAST	535-1640KC

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

To set pointer, turn tuning capacitor fully closed and set pointer parallel with base of dial.
Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading. Use an insulated alignment screwdriver for adjusting.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	RADIO DIAL SETTING	OUTPUT METER	ADJUST	REMARKS
1.	.05MFD	High side to antenna stator lug on tuning gang. Low side to B-.	455KC (400~Mod)	Tuning gang fully open	Across voice coil	A1, A2	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.	50MMF	Disconnect antenna hank from antenna coil (L1) and couple high side of signal generator thru 50 MMF to this terminal on L1. Low side to B-.	1640KC	"	"	A3	"
3.	"	"	1400KC	Tune to 1400KC signal	"	A4	Adjust for maximum deflection while rocking tuning gang thru 1400KC signal
4.	Check calibration at 600KC and 1000KC.						
5.	Repeat steps 2, 3 and 4.						

"The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co., Inc., as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co., Inc., by the manufacturers of the particular type of replacement part listed."
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PARTS LIST AND DESCRIPTIONS

SILVERTONE
MODEL 3007, (Ch. 757.120)

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	NOTES
		Silvertone PART No.	STANDARD REPLACEMENT		
V1	Converter	12BE6	12BE6	7CH	
V2	Det-AVC-AF Amp.	12AV6	12AV6	7BT	
V3	Audio Output	50L6GT	50L6GT	7S	
V4	Rectifier	35W4	35W4	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Silvertone PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	60	150	E324	PRS150/50-30-20		BBRQ53215C		3N532		Red Blue Yellow
B	30	150								
C	20	150								
C2	.05	400	E306	P488-05	DF-503	PTE4S5		PT415	4TM-S5	
C3	10			SII0	D6-100		GP1K-100		5GA-Q10	
C4A	2000									
B	220									
C			*E3015	*PA-113-1	*PC-150		*1408-01		*103C4	
D	5000									
E										
C5	.01	600	F301	P688-01	D6-103	PTE6S1	GP2-333-103	PT615	6TM-S1	
C6	.047	400	E342	689ZX-05		PJ4S47		PT4147	4TM-S47	
C7	.05	400	E306	P488-05		PTE4S5		PT415	4TM-S5	

* Items C4A, C4B, C4C, C4D, C4E, R5A, R5B, R5C are combined in one unit.
Items C4C and C4E should total 250MMF when replaced separately.

CONTROLS

ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Silvertone PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	2Meg	½	E251	Q13-139	AG-66-Z	AB-76	U-55	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A

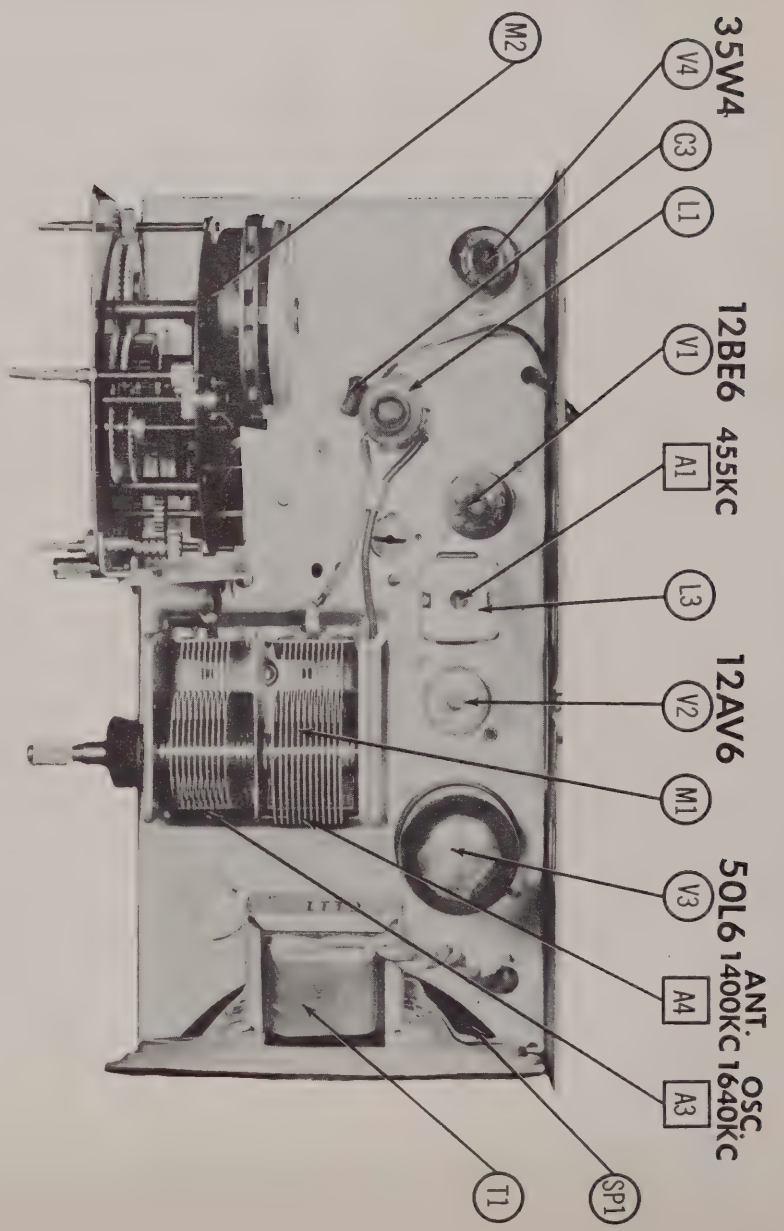
RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Silvertone PART No.	IRC PART No.	
R2	680Ω	½		BTS-680	
R3	22KΩ	½		BTS-22K	
R4	3.3Meg	½		BTS-3.3Meg	
R5A	6.8Meg	½		BTS-6.8Meg	
B	470KΩ	½	E3015 *	BTS-470K	
C	470KΩ	½		BTS-470K	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Silvertone PART No.	IRC PART No.	
R6	120Ω	½		BTS-120	
R7	2200Ω	1		BTA-2200	
R8	22Ω	½		BTS-22	
R9	47Ω	2			

* Items R5A, R5B, R5C, C4A, C4B, C4C, C4D, C4E are combined in one unit.

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		Silvertone PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.36KΩ	3.2Ω	200Ω	.59Ω	Part of Spkr.	A-3332	A-3025	RO-2 ①	S-2X ①	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Silvertone PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.2Ω	E103	ST-113 Mod. P4-X	4A07	

COILS (RF-IF)

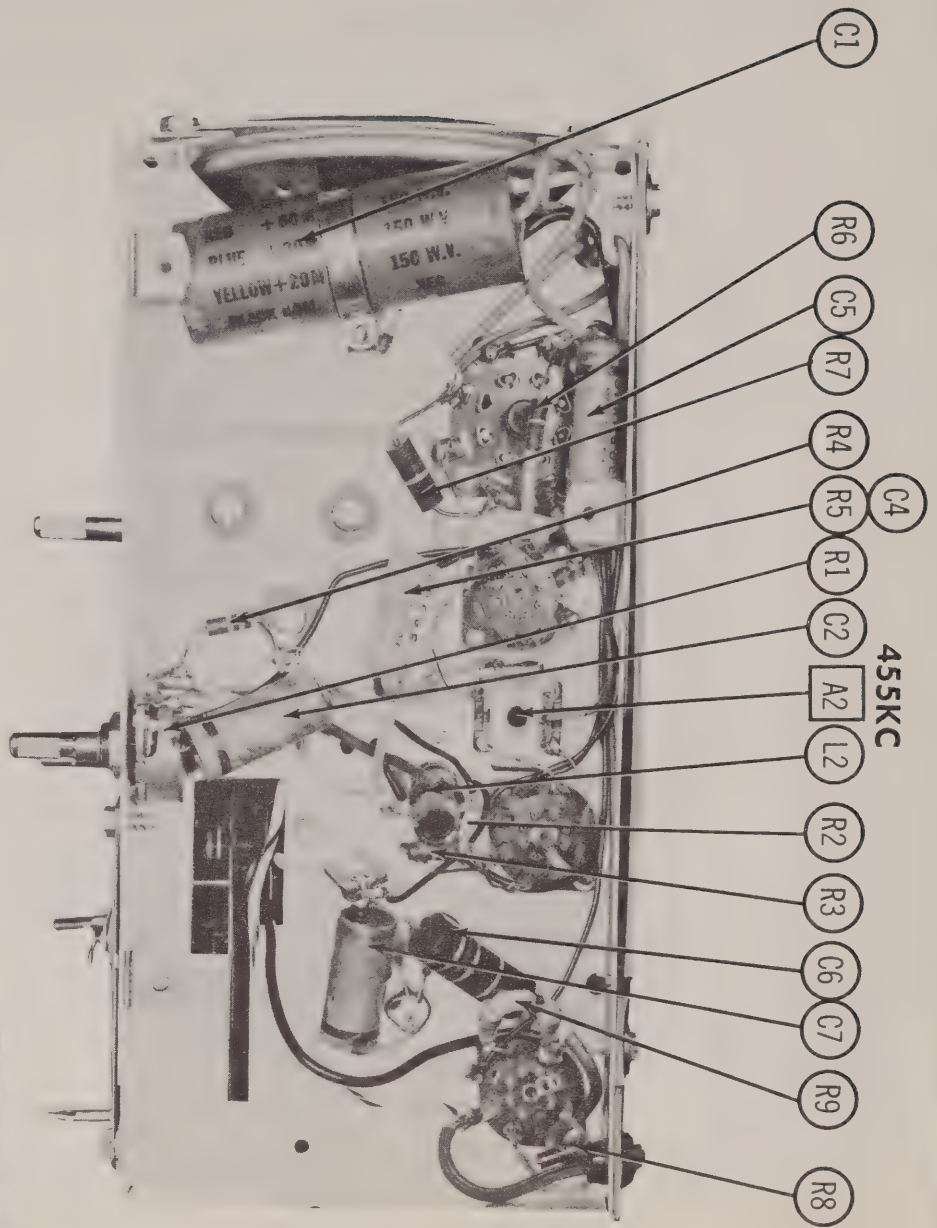
ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	Silvertone PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	Ant. Coil	90Ω	2.8Ω	E-615	14-1026	BC-380	72-A	
L2	Osc. Coil	.5Ω	5.5Ω	E-618	14-1073		69-Osc.	
L3	IF Trans.	20Ω	20Ω tap ⓐ 2.3Ω	E-623	16-6758 *	BC-353 *	12-C2 *	

* Connect B+ line to pin 6 of V1.

MISCELLANEOUS

ITEM No.	PART NAME	Silvertone PART No.	NOTES
M1	Tuning cap	E354	2 gang (25-367MMF, 27-190MMF)
	Clock	E133	Complete with timer assembly & switch
	Cabinet	E707	ebony-Model 3007
	Cabinet	E708	ivory-Model 3008
	Cabinet	E709	green-Model 3009
	Knob	E508	Clock -3used
	Knob	E506	Tuning
	Knob	E507	Volume
	Back	E573	

CHASSIS—BOTTOM VIEW



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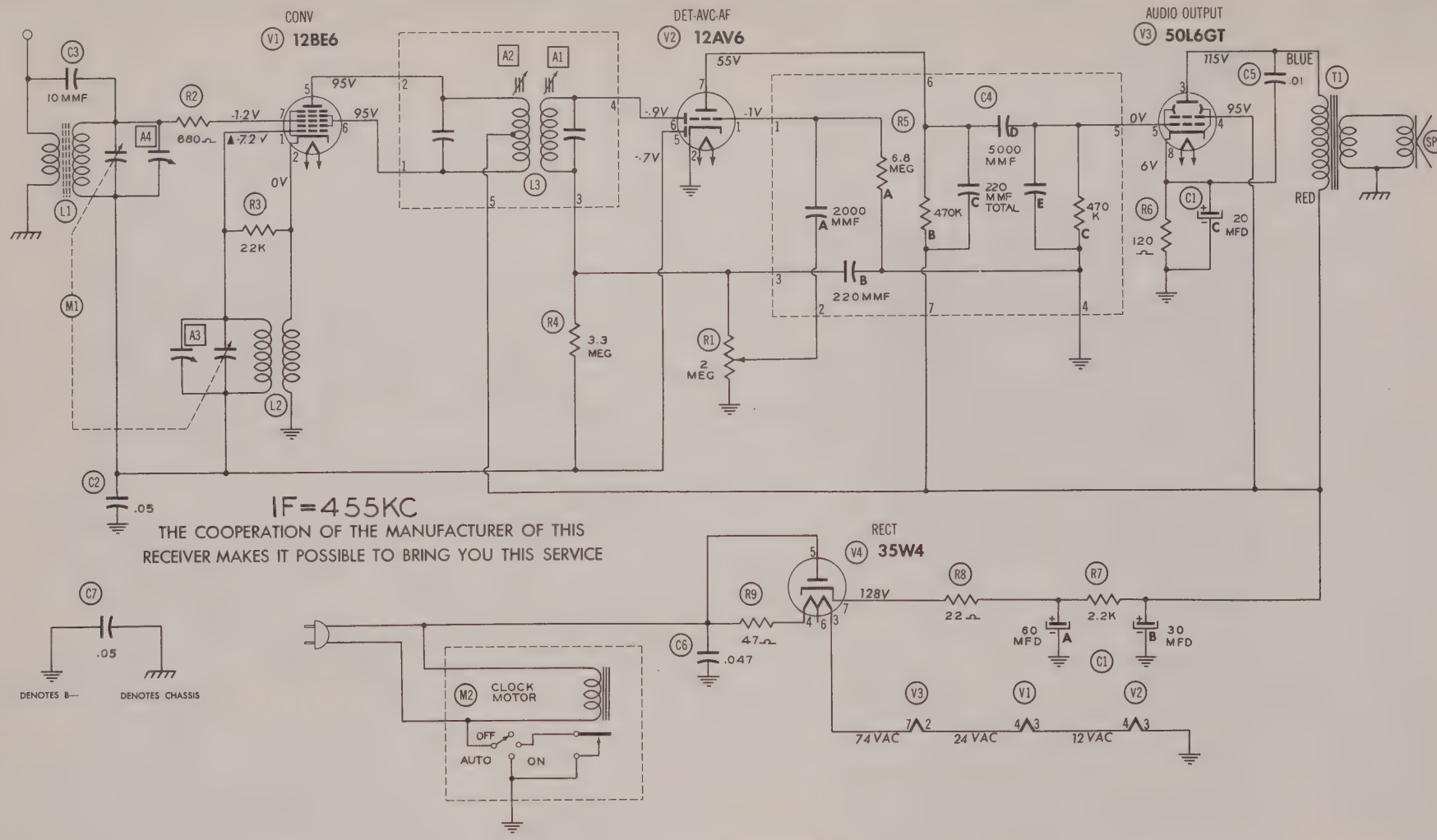
DENVER, COLORADO

SILVERTONE
MODEL 3007, (Ch. 757.120)

SILVERTONE
MODEL 3007, (Ch. 757.120)



IF=455KC

THE COOPERATION OF THE MANUFACTURER OF THIS RECEIVER MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
V 1	12BE6	22KΩ	.5Ω	16Ω	32Ω	†2.2KΩ	†2.2KΩ	5.3Meg	
V 2	12AV6	6.8Meg	0Ω	0Ω	16Ω	5.3Meg	2Meg	†470KΩ	
V 3	50L6	INF	32Ω	†225Ω	†2.2KΩ	470KΩ	†22Ω	120Ω	120Ω
V 4	35W4	†22Ω	INF	120Ω	180Ω	240Ω	170Ω	100KΩ	

* DO NOT USE OHMMETER TO MEASURE FILAMENT RESISTANCE
▲ TAKEN WITH VACUUM TUBE VOLTMETER
† MEASURED FROM PIN 7 OF V4

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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226-9

1- DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2- Socket connections are shown as bottom views.
3- Measured values are from socket pin to common negative.
4- Line voltage maintained at 117 volts for voltage readings.
5- Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6- Volume control at maximum, no signal applied for voltage measurements.

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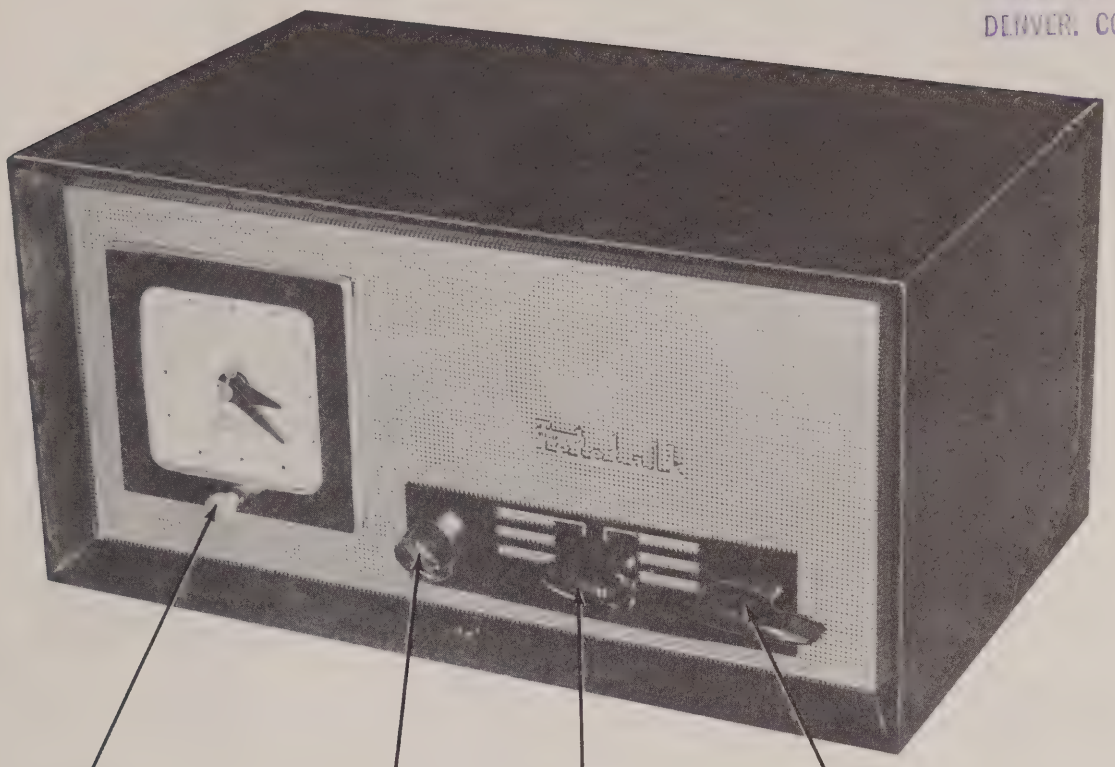
WEBSTER ELECTRIC
MODEL 1105M



WEBSTER ELECTRIC
MODEL 1105M

TRADE NAME	Webster Electric Model 1105M
MANUFACTURER	Webster-Electric Co., Racine, Wisc.
TYPE SET	AC Operated Intercommunication System Master Unit
TUBES (Three)	Types 12BA6 AF Amp., 50C5 Audio Output, 35W4 Rectifier
POWER SUPPLY	110-120 Volts AC RATING .19 Amp. @ 117 Volts AC

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PARTS LIST AND DESCRIPTIONS

WEBSTER ELECTRIC
MODEL 1105M

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	NOTES
		Webster Electric PART No.	STANDARD REPLACEMENT		
V1	AF Amplifier	12BA6	12BA6	7BK	
V2	Audio Output	50C5	50C5	7CV	
V3	Rectifier	35W5	35W5	5BQ	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Webster-Electric PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	■50	150		AFH3-77		CO56			R1404	
B	▲30	150								
C	10	25								
C2	.006	200		P288-006	D6-602	PTE4D6	GP2-333-602	PT426	2TM-D6	
C3	.005	600		P688-005	D6-502	PTE6D5	GP2-333-502	PT625	6TM-D5	
C4	.02	400		P488-02		PTE4S2		PT412	4TM-S2	
C5	.1	400		P488-1	DF-104	PTE4P1		PT401	4TM-P1	

CONTROLS

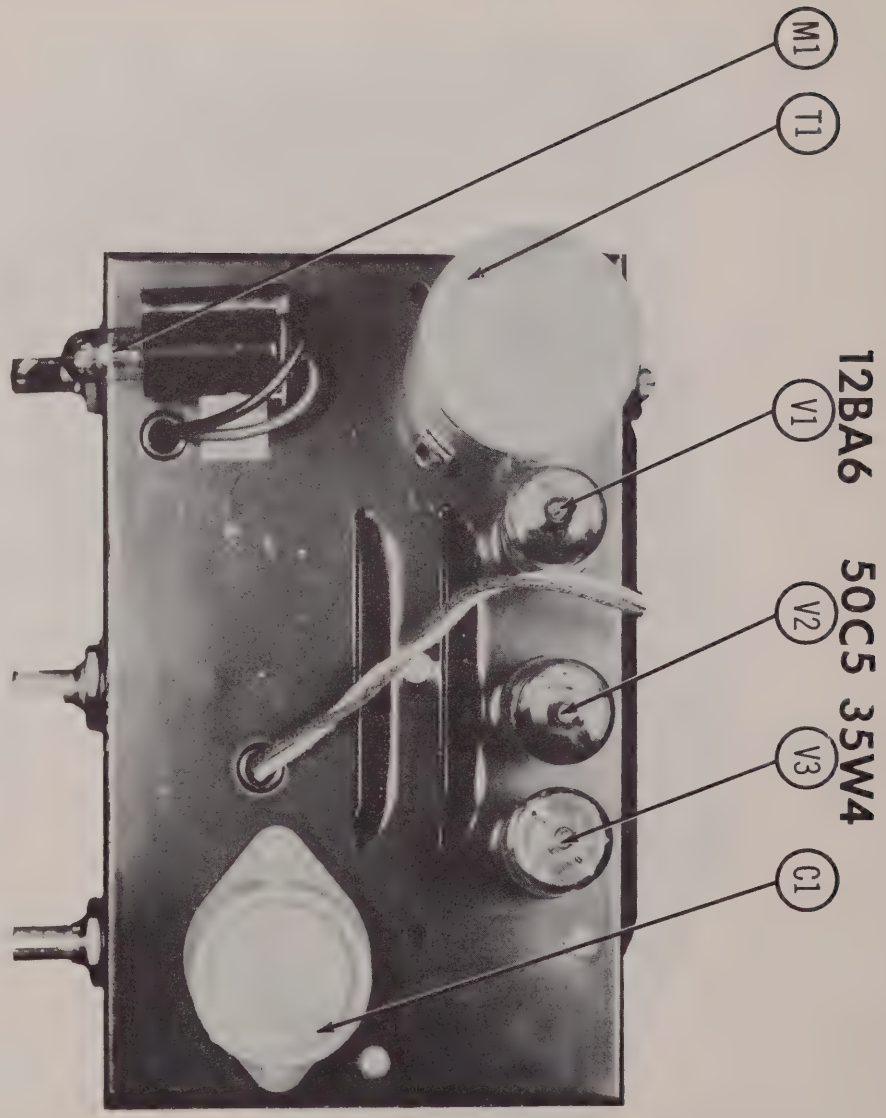
ITEM No.	RATING		REPLACEMENT DATA					INSTALLATION NOTES
	RESISTANCE	WATTS	Webster Electric PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	
R1A	500KΩ	½	S6926	Q13-133	AG-60-Z	B-60-S	U-48	Volume
B	Shaft		Not Req.	Not Req.	FS-3	Not Req.	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	Not Req.	US-26	Attach to R1A

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Webster Electric PART No.	IRC PART No.	
R2	10Meg	½		BTS-10Meg	
R3	1.5Meg	½		BTS-1.5Meg	
R4	500KΩ	½			
R5	160Ω	½			
R6	240Ω	½			

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	Webster Electric PART No.	IRC PART No.	
R7	5000Ω	½			
R8	50Ω	½			
R9	200Ω	5		1 3/4A-200	
R10	100Ω	½		BTS-100	

CHASSIS—TOP VIEW



PARTS LIST AND DESCRIPTIONS (Continued)

TRANSFORMER (INPUT)

ITEM No.	RATING				REPLACEMENT DATA				
	PRI.	SEC. 1	SEC. 2	SEC. 3	Webster-Electric PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
T1	1.3Ω	1.2KΩ Turns Ratio 1 to 260							

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		Webster Electric PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T2	2.5KΩ	45Ω	320Ω	4.2Ω						

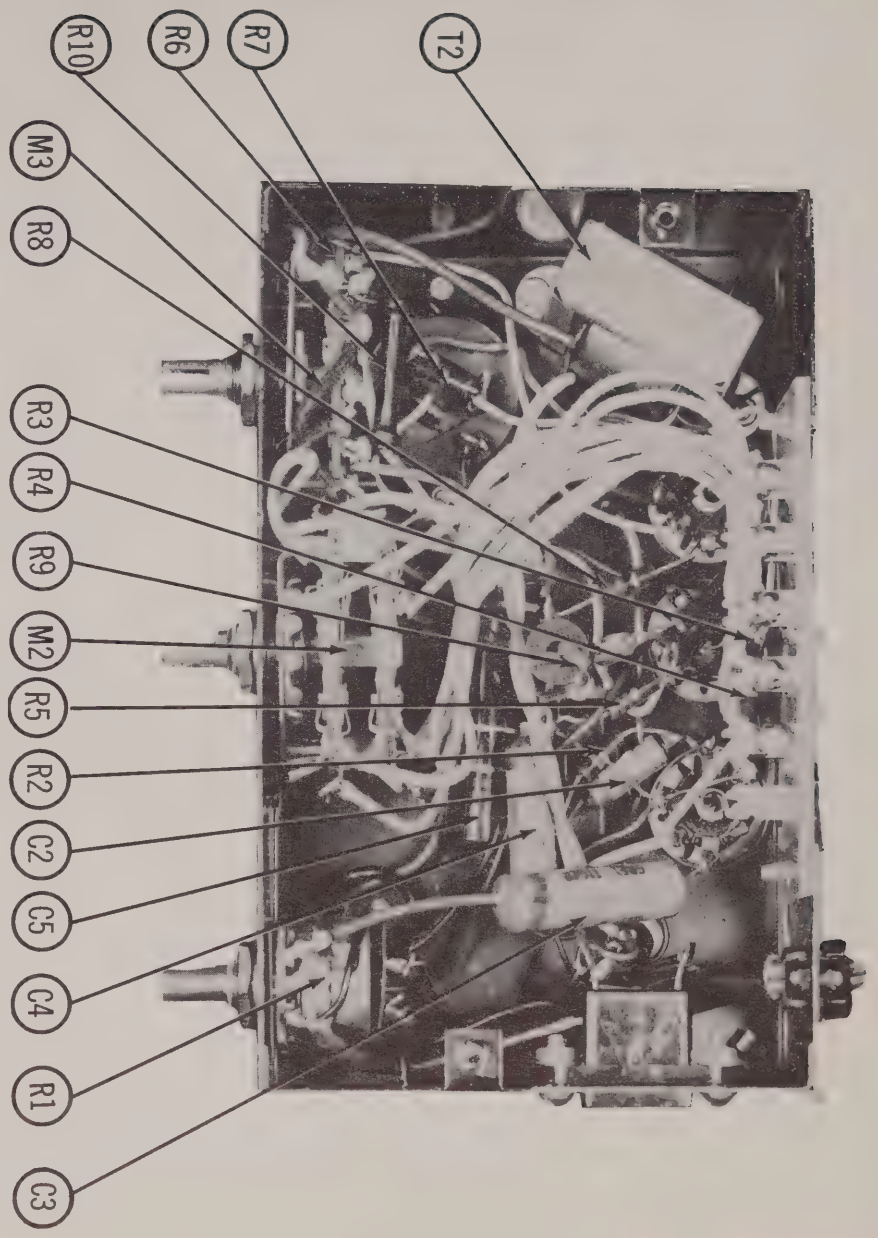
SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	Webster Electric PART No.	JENSEN PART No.	QUAM PART No.	
SP1	3½"	PM	45Ω			3A07Z45	

MISCELLANEOUS

ITEM No.	PART NAME	Webster Electric PART No.	NOTES
M1	Dial light		#47 bayonet
M2	Switch		6 position-rotary-2 deck station selector
M3	Switch		Talk-listen-rotary-single deck

CHASSIS—BOTTOM VIEW



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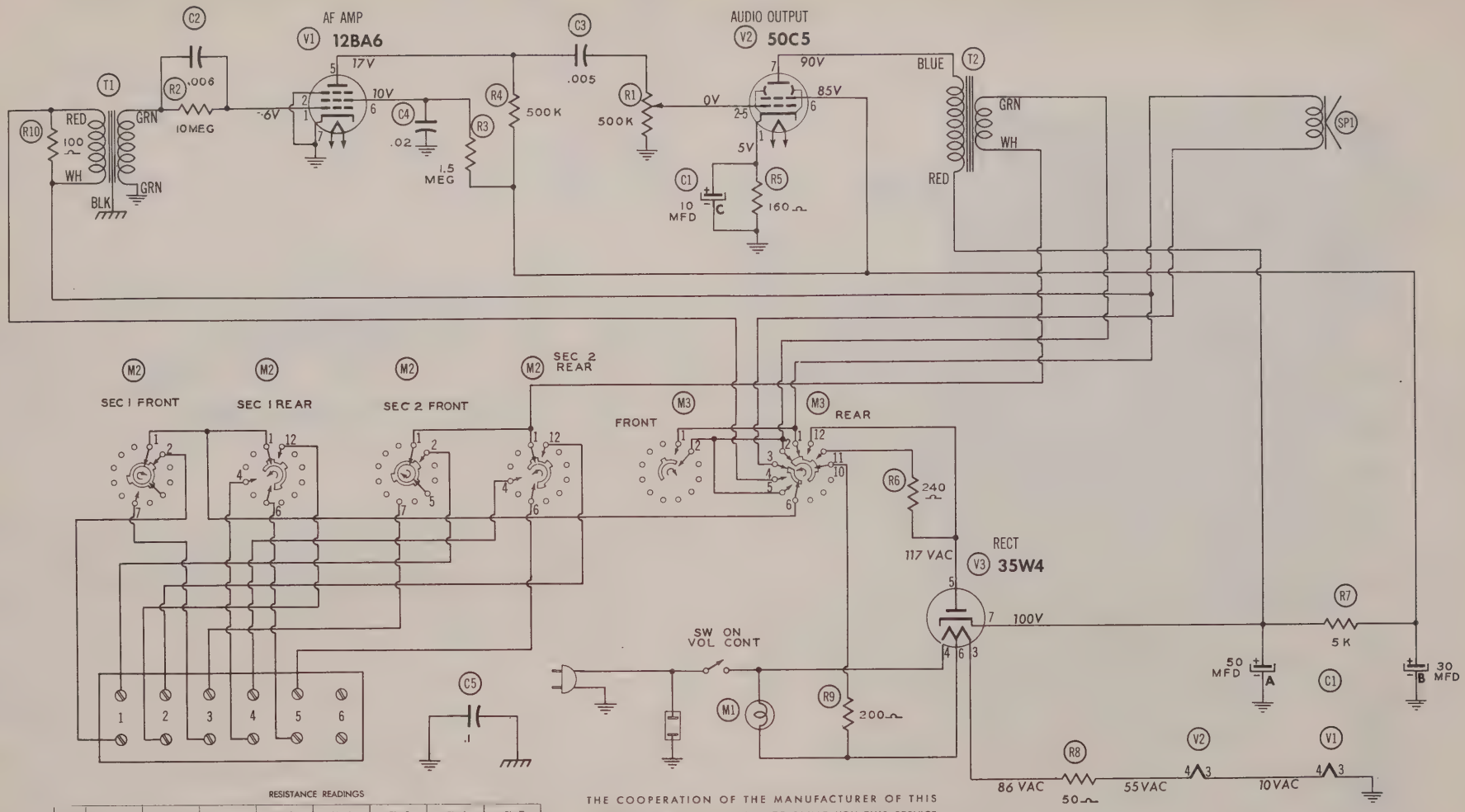
WEBSTER ELECTRIC
MODEL 1105M

WEBSTER ELECTRIC
MODEL 1105M



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7
V 1	12BA6	10Meg	0Ω	0Ω	11Ω	† 500KΩ	† 1.5Meg	0Ω
V 2	50C5	160Ω	500KΩ	11Ω	70Ω	500KΩ	† 6KΩ	† 320Ω
V 3	35W4	INF	INF	270Ω	300Ω	600Ω	300Ω	1Meg

† MEASURED FROM PIN 7 OF V3.

THE COOPERATION OF THE MANUFACTURER OF THIS EQUIPMENT MAKES IT POSSIBLE TO BRING YOU THIS SERVICE

A PHOTOFACT STANDARD NOTATION SCHEMATIC

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1 - DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2 - Socket connections are shown as bottom views.
3 - Measured values are from socket pin to common negative.
4 - Line voltage maintained at 117 volts for voltage readings.
5 - Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6 - All controls at minimum, proper output load connected.

PHOTOFACT* Folder

RETMA MEMBER

WELLS GARDNER
MODELS 321MS39-322, -372-2, -376-1, 2321MS39-324, -370, -396-1

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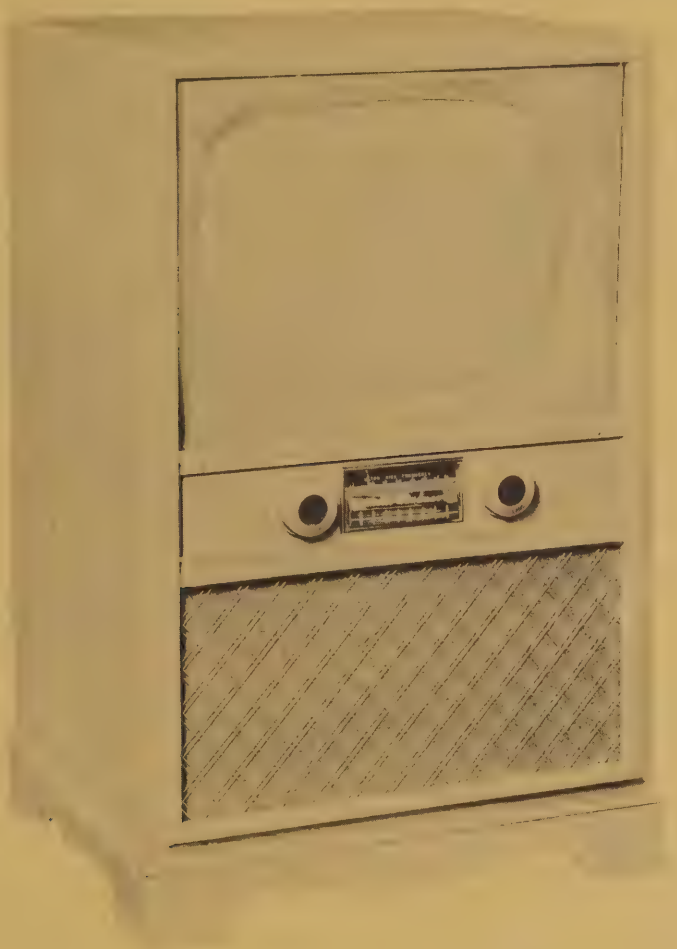

MODEL 2321MS39-396-1

WELLS GARDNER
MODELS 321MS39-322, -372-2, -376-1, 2321MS39-324, -370, -396-1

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WELLS GARDNER MODELS 321MS39-322, -372-2, -376-1, 2321MS39-324, -370, -396-1

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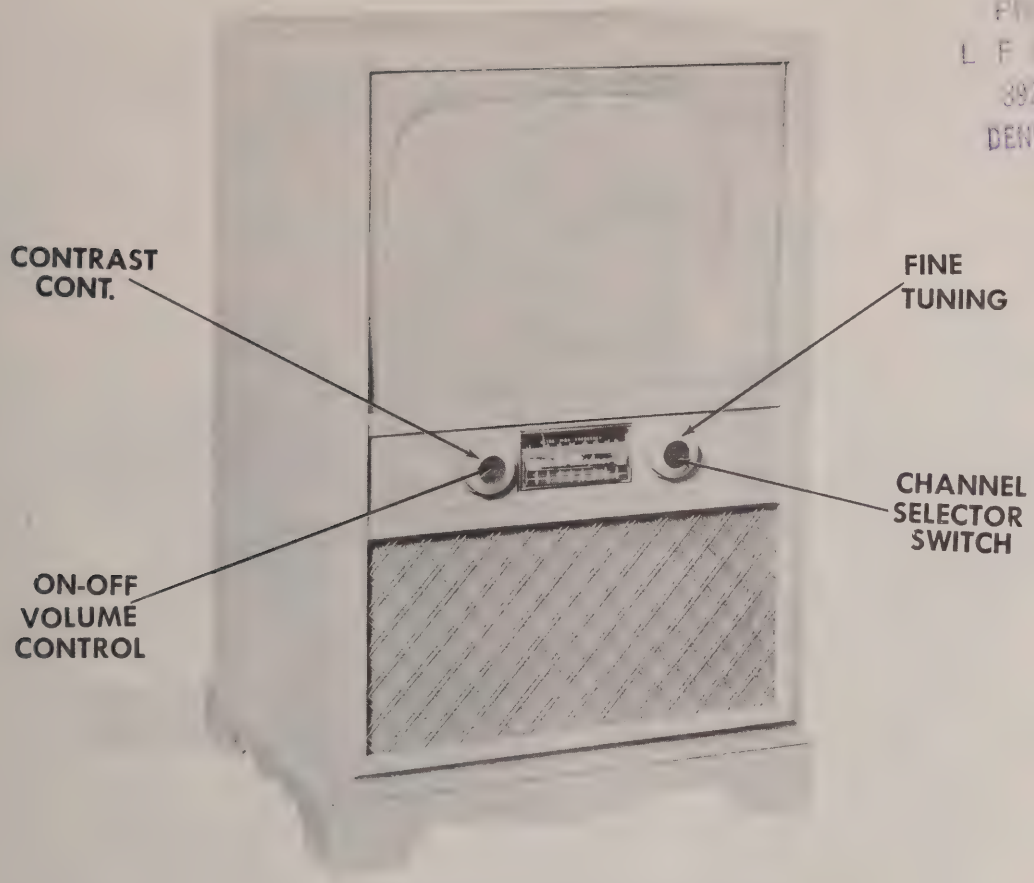

WELLS GARDNER
MODELS 321MS39-322, -372-2,
-376-1, 2321MS39-324, -370, -396-1

WELLS-GARDNER MODEL 2321MS39-396-1

TRADE NAME	Wells-Gardner Models 321MS39-322, -372-2, -376-1, 2321MS39-324, -370, -396-1
MANUFACTURER	Wells-Gardner Co., 2701 N. Kildare Ave., Chicago 39, Ill.
TYPE SET	Television Receiver
TUBES	Twenty-Five
POWER SUPPLY	110-120 Volts AC-60 Cycle RATING 2 Amp. @ 117 Volts AC
TUNING RANGE-	Channels 2 thru 13 VHF, 14 thru 83UHF, Video IF 26.2MC, Sound IF 21.7MC (Intercarrier)

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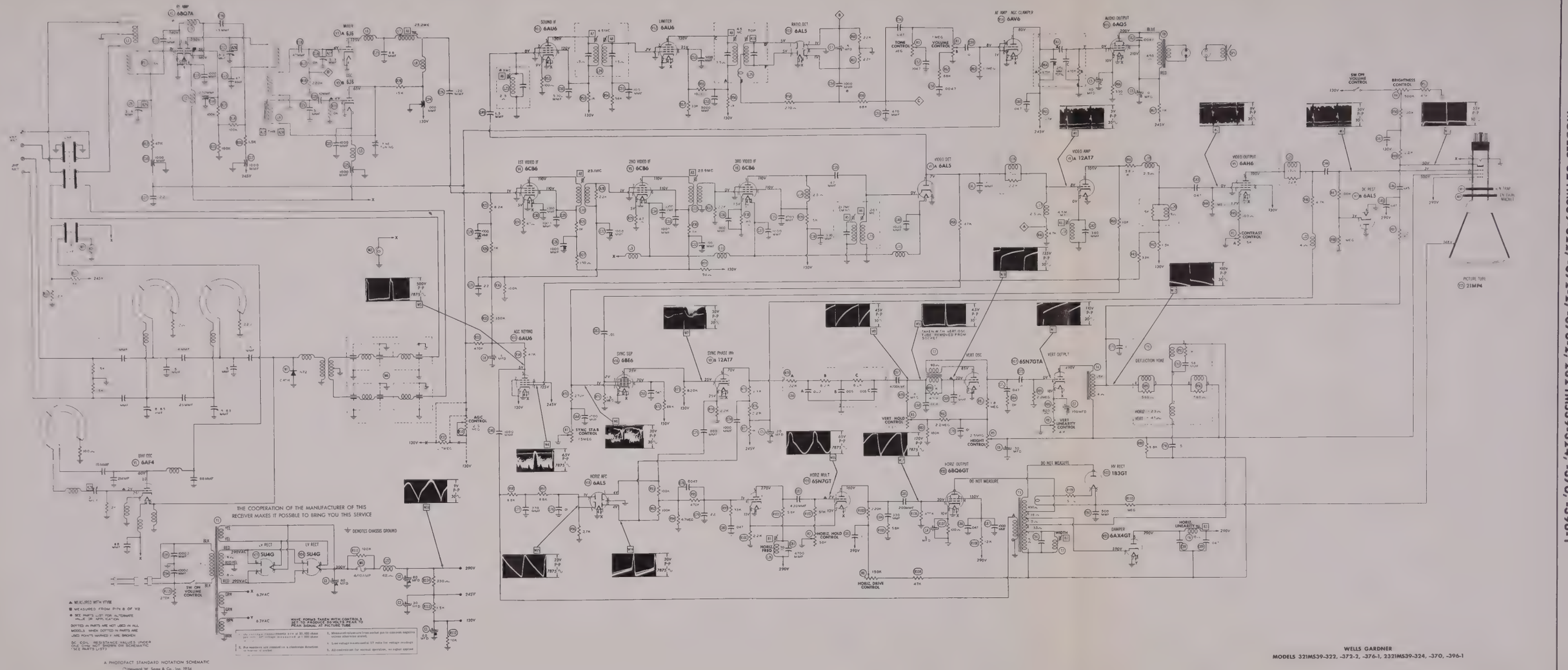
DATE 1-54 SET 226 FOLDER 11



WELLS GARDNER
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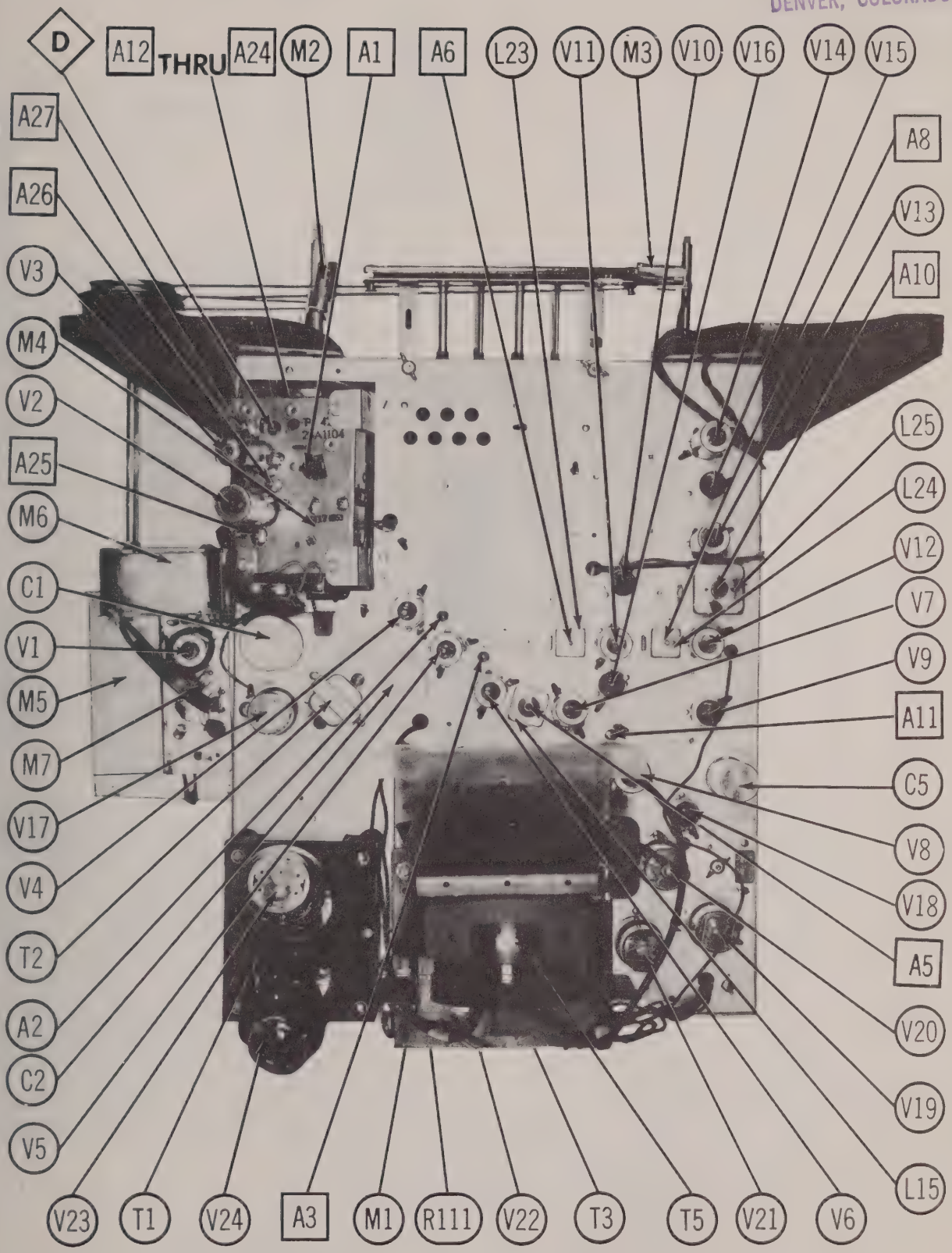
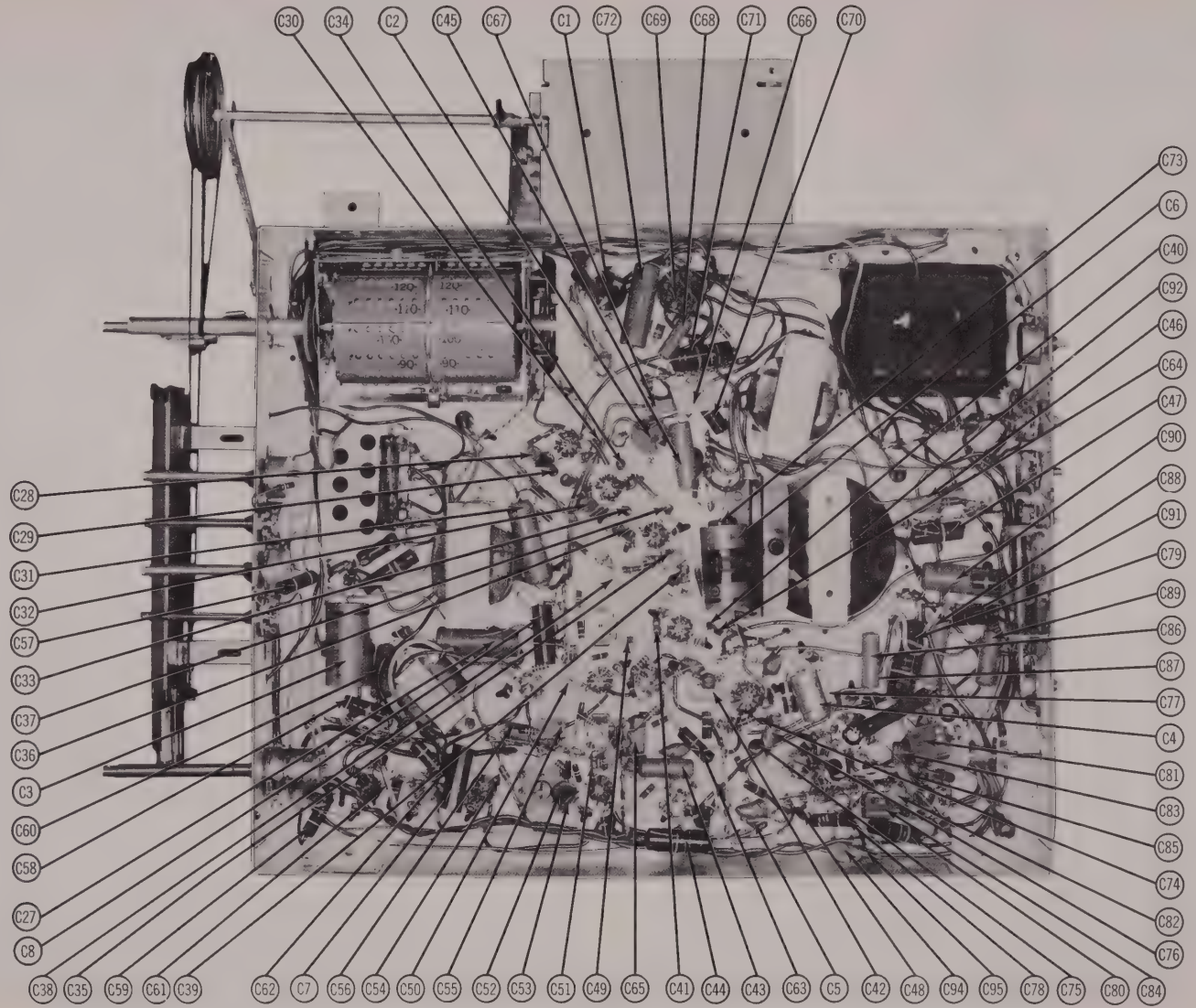


CHASSIS TOP VIEW

SET 226 FOLDER 11



CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION

TUBE PLACEMENT CHART

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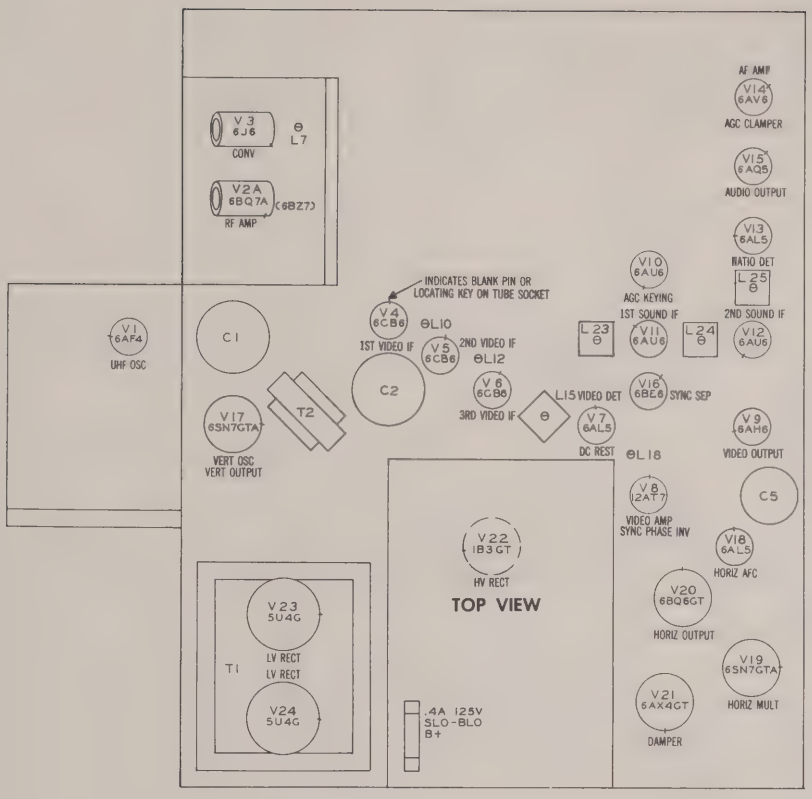

TUBE FAILURE CHECK CHART

The following chart lists tubes whose failures are most likely to produce the indicated symptoms. Refer to tube placement chart for location and type of tube.

POWER SUPPLY FAILURE
No raster, no sound - V23, V24, Fuse (M1)

LOSS OF PICTURE OR SOUND
No pic, no sound, has raster - V3, V4, V5, V6, V7 (V1 UHF only)
No pic, no sound, has snow - V2, V3, V4
No pic, has sound, has raster - V8, V9, V25
Has pic, no sound - V11, V12, V13, V14, V15
Overloaded picture - V10, V14

SYNC FAILURE
No vert. sync - V8, V17
No horiz. sync - V8, V18, V19
No vert. or horiz. sync - V8, V16

SWEEP FAILURE
No raster, has sound - V19, V20, V21, V22, V25
No vertical deflection - V17
Poor vert. linearity or foldover - V17
Poor horiz. linearity or foldover - V19, V20, V21
Narrow picture - V19, V20, V21, V22, V23, V24
Vert. off freq. - V8, V17
Horiz. off freq. - V8, V18, V19

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

The high voltage shock hazard may be eliminated by removing the horizontal oscillator tube, V19.

VIDEO IF ALIGNMENT

Remove the converter tube, V2, and replace with a 6J6 which has pin 1 removed. This will disable the local oscillator and reduce the possibility of erroneous indications.
Connect the negative lead of a 4.5Volt bias supply to the ungrounded side of C31. Connect the positive lead to chassis.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
1.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	25.2MC (Unmod.)	Any	DC probe thru decoupling filter (Fig.1) to point A . Common to chassis.	A1	Adjust for maximum deflection.
2.	"	"	23.1MC	"	"	A2	"
3.	"	"	25.9MC	"	"	A3	"
4.	"	"	24.1MC	"	"	A4	"
5.	"	"	21.7MC	"	"	A5	Adjust for MINIMUM deflection.

OVERALL VIDEO IF RESPONSE CHECK

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
6.	Direct	High side to an ungrounded tube shield floating over dummy converter tube. Low side to chassis.	24MC (10MC Swp)	21.7MC 23.0MC 23.5MC 25.25MC 26.2MC	Any	Vert. Amp. thru decoupling filter (Fig. 1) to point A . Low side to chassis.		Check for response curve similar to Fig.3. If necessary retouch A1 thru A4 for desired response.

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	CHANNEL	CONNECT VTVM	ADJUST	REMARKS
7.	.01MFD	High side to pin 1 (cathode) of 6AL5 (V7A). Low side to chassis.	4.5MC (Unmod.)	Any	DC probe to point B . Common to chassis.	A6, A7, A8, A9	Adjust for maximum deflection.
8.	"	"	"	"	DC probe to point C . Common to chassis.	A10	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
7.	.01MFD	High side to pin 1 (cathode) of 6AL5 (V7A). Low side to chassis.	4.5MC (450KC Swp)	4.5MC	Any	Vert. Amp. thru decoupler (Fig.1) to point B . Low side to chassis.	A6, A7, A8, A9	Disconnect stabilizer capacitor C7. Adjust for curve of maximum amplitide and symmetry as in Fig. 3.
8.	"	"	"	"	"	Vert. Amp. thru decoupler (Fig.1) to point C . Low side to chassis.	A10	Reconnect stabilizer capacitor C7. Adjust so that 4.5MC occurs at center of crossover lines as in Fig. 4. SLIGHTLY retouch A9 for maximum amplitude and straightness of crossover lines.

4.5MC TRAP ALIGNMENT

Turn contrast control to maximum clockwise position.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
9.	Direct	High side to pin 7 of 6AL5 (V7A). Low side to chassis.	Not used	4.5MC (400~Mod)	Any	Vert. amp. thru decoupler (Fig.1) to pin 2 of picture tube. Low side to chassis.	A 11	Adjust for minimum 400~ indication on scope

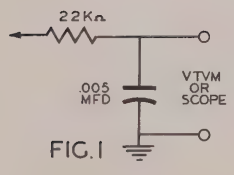

FIG.1

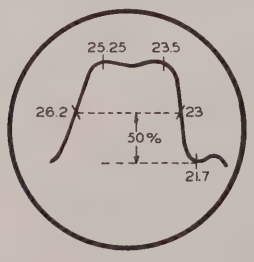

FIG.2

FIG. 3

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ALIGNMENT INSTRUCTIONS (cont)

OSCILLATOR ALIGNMENT

Remove the dummy converter tube and replace the original 6J6 in its socket.
The oscillator adjustment screws for each channel are reached through a hole just to the right of the channel switch shaft. The correct adjustment screw is accessible through this hole as the channel switch is turned to each channel.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.
Set the fine tuning control to the mid-position of its range.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
10.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	213MC (10MC Swp)	211.25MC 215.75MC	13	Vert. Amp. thru decoupler (Fig.1) to point A . Low side to chassis.	A12	Adjust to place sound marker in notch as in Fig. 5. Video marker should be at 50%.
			207MC (10MC Swp)	205.25MC 209.75MC	12		A13	
			201MC (10MC Swp)	199.25MC 203.75MC	11		A14	
			195MC (10MC Swp)	193.25MC 197.75MC	10		A15	
			189MC (10MC Swp)	187.25MC 191.75MC	9		A16	
			183MC (10MC Swp)	181.25MC 185.75MC	8		A17	
			177MC (10MC Swp)	175.25MC 179.75MC	7		A18	
			85MC (10MC Swp)	83.25MC 87.75MC	6		A19	
			79MC (10MC Swp)	77.25MC 81.75MC	5		A20	
			69MC (10MC Swp)	67.25MC 71.75MC	4		A21	
			63MC (10MC Swp)	61.25MC 65.75MC	3		A22	
			57MC (10MC Swp)	55.25MC 59.75MC	2		A23	
11.	"	Across output of UHF tuner	124MC (10MC Swp)	121.75MC 126.25MC	UHF		A24	

RF AND MIXER ALIGNMENT

Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.
The sweep generator output lead should be terminated with its characteristic impedance, usually 50 ohms.

	DUMMY ANTENNA	SWEEP GENERATOR COUPLING	SWEEP GENERATOR FREQUENCY	MARKER GENERATOR FREQUENCY	CHANNEL	CONNECT SCOPE	ADJUST	REMARKS
12.	Two 120Ω Carbon Resistors	Across antenna terminals with 120Ω in each lead.	207MC (10MC Swp)	205.25MC 209.75MC	12	Vert. Amp. thru decoupler (Fig.1) to point D . Low side to chassis.	A25, A26 A27	Adjust for response curve similar to Fig.6. with markers above 90%.
13.	"	"	213MC (10MC Swp)	211.25MC 215.75MC	13	"		Check for response similar to Fig.6. If markers fall below 70% on any channel make slight compromise adjustment of A24, A25, and A26 with channel switch set to that channel. Recheck all other channels to see that they have not been seriously affected.
			201MC (10MC Swp)	199.25MC 203.75MC	11			
			195MC (10MC Swp)	193.25MC 197.75MC	10			
			189MC (10MC Swp)	187.25MC 191.75MC	9			
			183MC (10MC Swp)	181.25MC 185.75MC	8			
			177MC (10MC Swp)	175.25MC 179.75MC	7			
			85MC (10MC Swp)	83.25MC 87.75MC	6			
			79MC (10MC Swp)	77.25MC 81.75MC	5			
			69MC (10MC Swp)	67.75MC 71.75MC	4			
			63MC (10MC Swp)	61.25MC 65.75MC	3			
			57MC (10MC Swp)	55.25MC 59.75MC	2			
			124MC (10MC Swp)	121.75MC 126.25MC	UHF			

UHF TUNER ALIGNMENT

Due to circuit complexity of the UHF tuner, alignment in the field should not be attempted.
Service should also be limited to the replacement of oscillator tube (V3) and crystal 1N72/1N82.
If either crystal or oscillator is replaced adjustment of the UHF oscillator trimmer, A28, maybe necessary. If necessary, adjust A28 for tuner range of below 470MC to above 890MC.
If the UHF tuner does not operate properly after tube or crystal replacement and adjustment of A28 the tuner should be returned to the factory.

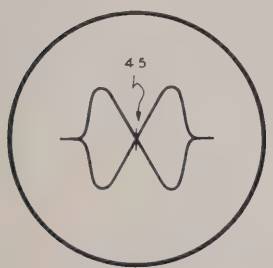


FIG. 4

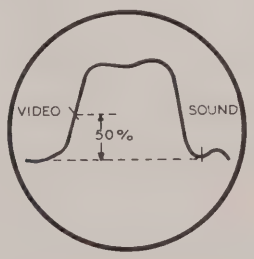


FIG.5

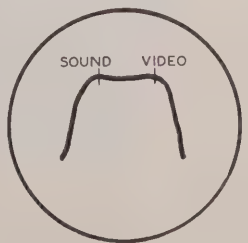
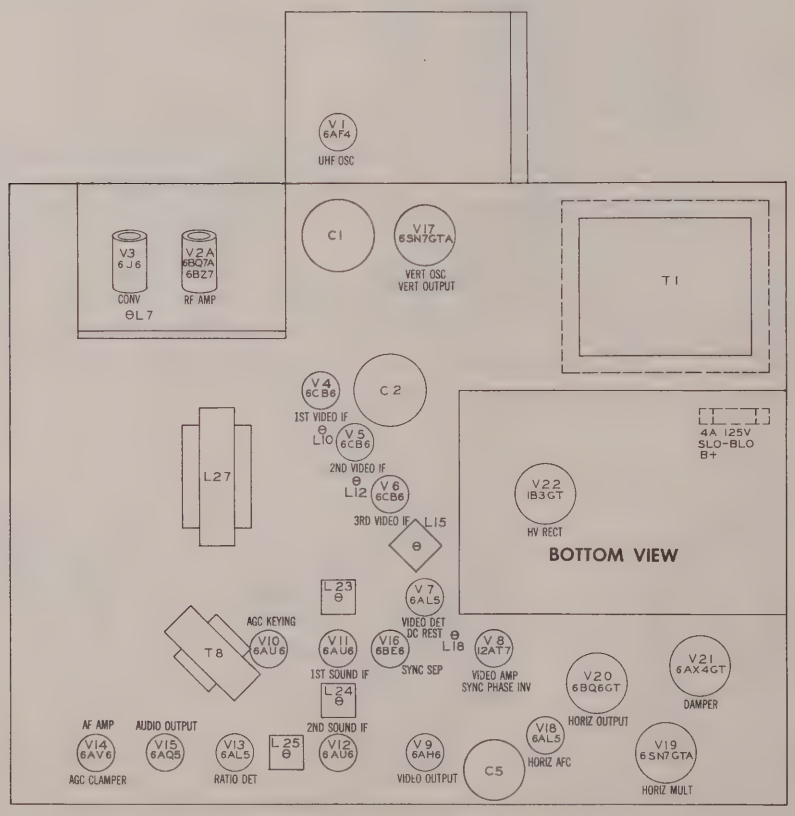


FIG. 6

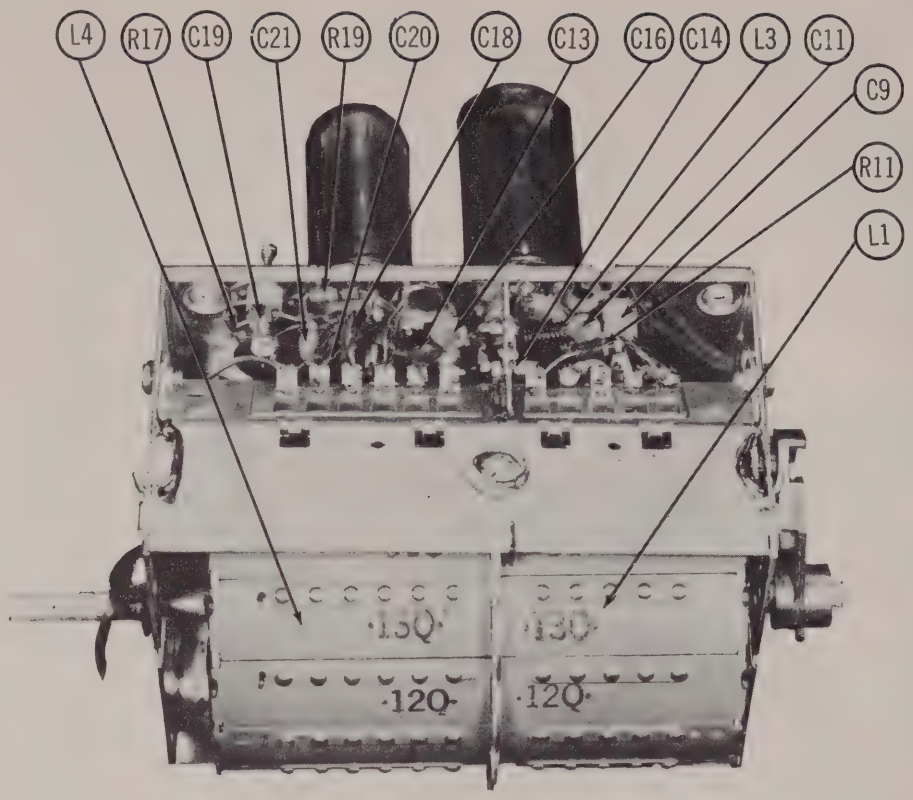
RESISTANCE MEASUREMENTS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6AF4	■6KΩ	12KΩ	.1Ω	.2Ω	.1Ω	12KΩ	■6KΩ		
V 2	6BQ7A	INF	680KΩ	0Ω	.1Ω	0Ω	■2KΩ	160KΩ	INF	0Ω
V 3	6J6	17KΩ	■2KΩ	.1Ω	0Ω	230KΩ	10KΩ	0Ω		
V 4	6CB6	110KΩ	47Ω	.1Ω	0Ω	■2.8KΩ	■2.8KΩ	0Ω		
V 5	6CB6	100KΩ	47Ω	.1Ω	0Ω	■2.8KΩ	■2.8KΩ	0Ω		
V 6	6CB6	.3Ω	180Ω	.1Ω	0Ω	■3KΩ	■3KΩ	0Ω		
V 7	6AL5	.7Ω	0Ω	.1Ω	0Ω	1Meg	0Ω	4.7KΩ		
V 8	12AT7	■8.5KΩ	4.7KΩ	.2Ω	0Ω	0Ω	■7.5KΩ	■820KΩ	2.2KΩ	.1Ω
V 9	6AH6	1Meg	0Ω	.1Ω	0Ω	■6.2KΩ	■1.8KΩ	500Ω		
V 10	6AU6	■36.5K	■1.8KΩ	.1Ω	0Ω	470KΩ	■400Ω	■1.8KΩ		
V 11	6AU6	.1Ω	0Ω	.1Ω	0Ω	■2.6KΩ	■2.6KΩ	100Ω		
V 12	6AU6	56KΩ	0Ω	.1Ω	0Ω	■2.6KΩ	■24KΩ	0Ω		
V 13	6AL5	INF	INF	0Ω	.1Ω	22KΩ	INF	22KΩ		
V 14	6AV6	10Meg	0Ω	.1Ω	0Ω	680KΩ	680KΩ	■520KΩ		
V 15	6AQ5	470KΩ	330Ω	0Ω	.1Ω	■1.7KΩ	■1.3KΩ	470KΩ		
V 16	6BE6	40KΩ	0Ω	.1Ω	0Ω	■820KΩ	■70KΩ	1.5Meg		
V 17	6SN7GT	2Meg	▲1.7Meg	0Ω	2.2Meg	▲7KΩ	2KΩ	.1Ω	0Ω	
V 18	6AL5	4.8Meg	4.8Meg	.1Ω	0Ω	9KΩ	INF	9KΩ		
V 19	6SN7GT	170KΩ	▲340KΩ	2.2KΩ	5Meg	■5.6KΩ	2.2KΩ	.1Ω	0Ω	
V 20	6BQ6GT	5.6KΩ	0Ω	INF	■12KΩ	470KΩ	420KΩ	.1Ω	100Ω	TOP CAP ▲16Ω
V 21	6AX4GT	6.3KΩ	INF	440KΩ	4.5Meg	■50Ω	6.3KΩ	0Ω	.1Ω	
V 22	1B3GT	PINS 1-8 HAVE INF. RESISTANCE								TOP CAP ▲446Ω
V 23	5U4G	INF	10KΩ	INF	18Ω	INF	19.5Ω	INF	10KΩ	
V 24	5U4G	INF	10KΩ	INF	18Ω	INF	19.5Ω	INF	10KΩ	
V 25	21MP4	0Ω	1.1Meg	PIN 6 ■50Ω	PIN 10 ▲6.8KΩ	PIN 11 ■180KΩ	PIN 12 .1Ω			

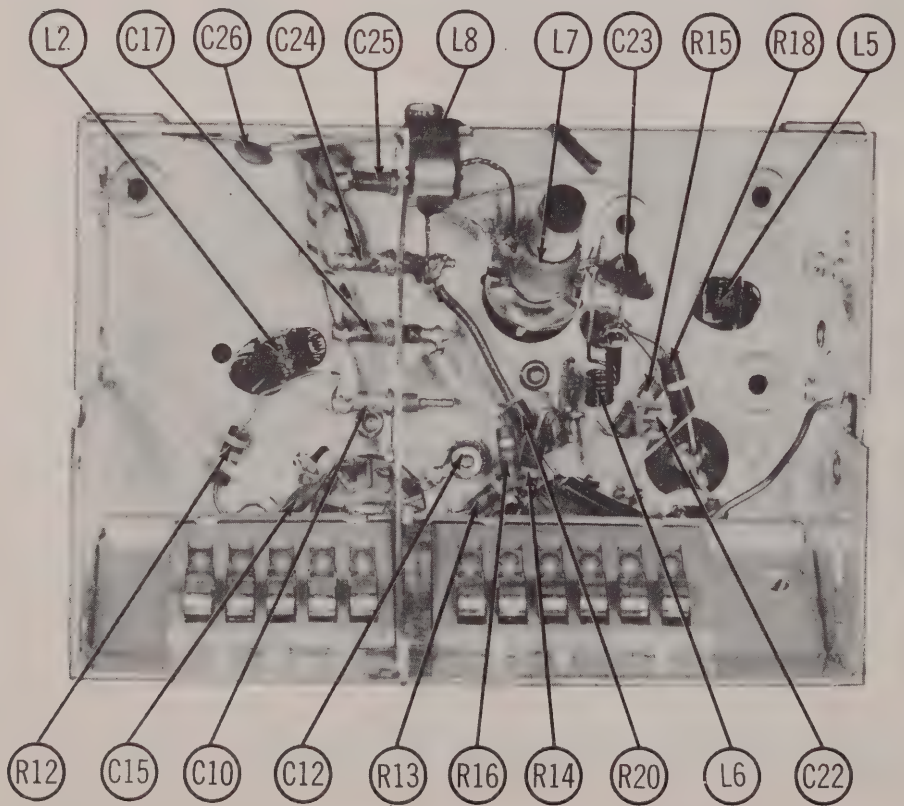
■MEASURED FROM PIN 2 OF V24.
▲MEASURED FROM PIN 3 OF V21.



TUBE PLACEMENT CHART



RF TUNER-RIGHT SIDE



RF TUNER-BOTTOM VIEW

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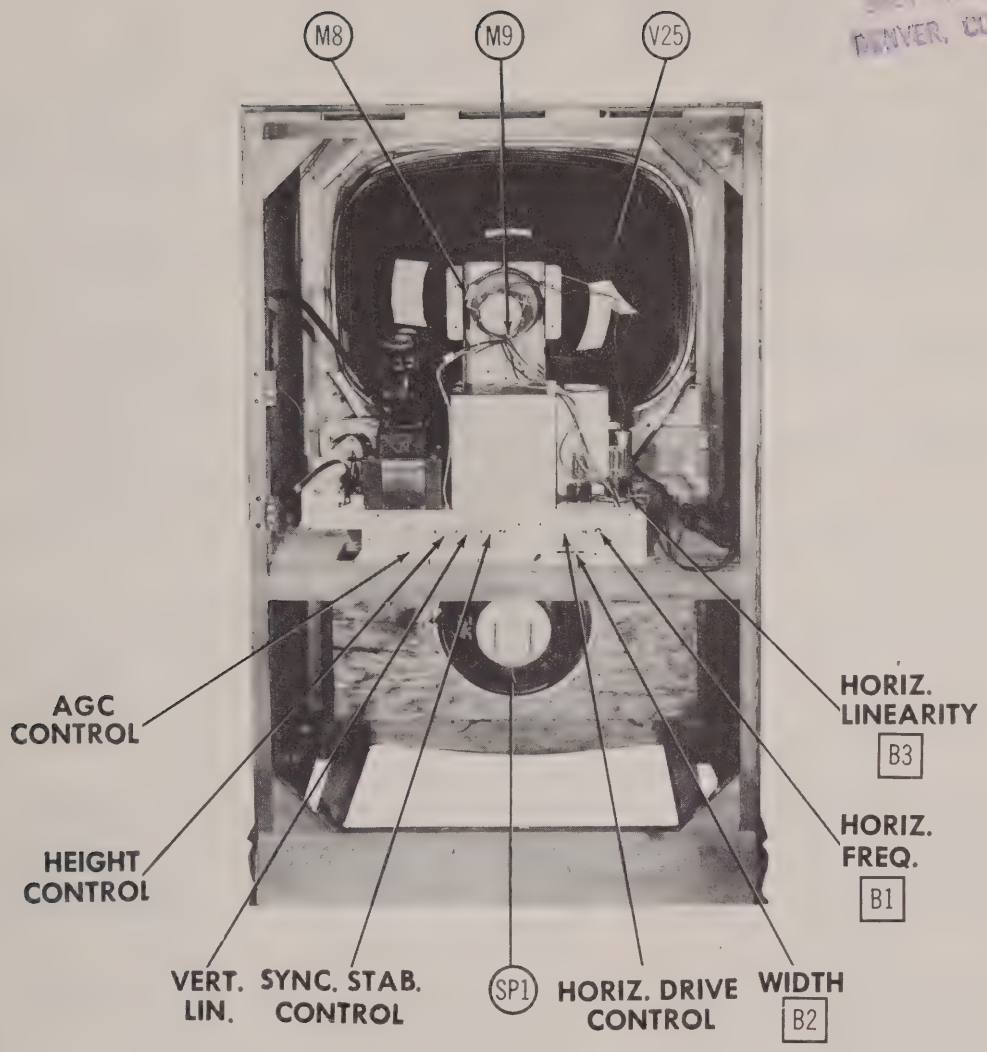

CABINET—REAR VIEW

HORIZONTAL SWEEP CIRCUIT ADJUSTMENTS

Turn the set on and tune in a TV station, preferably a test pattern.

Set the horizontal hold control at the center of its range and adjust the horizontal frequency slug (B1) until the picture falls into sync.

Adjust the horizontal drive control for the best compromeise between brightness and linearity.

Adjust the width slug (B2) for a picture slightly wider than necessary to fill the picture mask horizontally.

Adjust the horizontal linearity slug (B3) for a picture that is symmetrical from left to right.

TROUBLE SHOOTING AIDS

SWEEP

HORIZONTAL

LOSS OF SWEEP

Follow procedure outlined under "Loss of High Voltage".

INSUFFICIENT SWEEP

Check by substitution V19, V20, V21, V23 and V24. Check adjustment of horiz. drive control, B2 and B3. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check C86, C87, C90, C91, T3, T5A, R108 and other associated components.	Check C82, C83, C84, C85, R103, R104, R106, R101, R100, R6 and other associated components.

DRIVE LINES

Check adjustment of horiz. drive control. Check by substitution V19, V20 and V21. Check C83, C84, C85, C88, C89, T3, T5A and other associated circuit components.

COMPRESSED LEFT SIDE

Check horiz. drive adjustment. Check adjustment of B2 and B3. Check by substitution V19, V20 and V21. Check T3, T5A, C86, C87 and other associated components.

FOLDS

Check by substitution V19, V20 and V21. Check T3, T5A and other associated components.

XMAS TREE EFFECT

Substitute V19. Check C81, C82 and other components associated with V19.

VERTICAL

LOSS OF SWEEP

Substitute V17. Check waveform W11.

If Satisfactory	If Unsatisfactory
Check T4 and T5B.	Check C71, C72, C68, C69, R88, R81 and other associated components.

INSUFFICIENT SWEEP

Substitute V17. Check adjustment of height and vertical linearity controls. Proceed as outlined under "Loss of Sweep".

COMPRESSED AT BOTTOM

Substitute V17. Check R81, R9, C70, R85, C72 and other associated circuit components.

COMPRESSED AT TOP

Substitute V17. Check C2B, T4, T5B, R8 and other associated components.

FOLDS

Substitute V17. Check assoicated circuit components.

SYNC

HORIZONTAL

LOSS OF SYNC

Check by substitution V18 and V19. Check waveform W14.

If Satisfactory	If Unsatisfactory
Check components associated with V18 and V19 especially R98, R97, R95 R99, C76, C77, C79 and C80.	Check C74, C75, R92 and R93.

CRITICAL HOLD

Check by substitution V18 and V19. Check adjustment of B1. Follow procedure outlined under "Loss of Sync".

HORIZONTAL BENDING OR S-ING

Check by substitution V19, V20, V16 and V8. Check adjustment of sync stability and AGC threshold controls. Check C1A and C2A.

VERTICAL

LOSS OF SYNC

Check by substitution V16, V8 and V17. Check waveform W9.

If Satisfactory	If Unsatisfactory
Check components associated with V17 especially C68 and T2.	Check vert. integrator network C67, C63 and other components associated with V16 and V8.

CRITICAL HOLD

Substitute V17, V16 and V8. Check adjustment of sync stability and AGC threshold controls. Proceed as outlined under "Loss of Sync".

TRIGGERING

Check by substitution V17, V16 and V8. Check circuit near these stages for filament lead dress.

VIDEO

LOSS OF VIDEO

Check by substitution V7, V8 and V9. Check picture tube and other associated components especially coupling capacitors and plate load resistors.

SOUND BARS (4.5 MC BEAT)

Check alignment of local oscillator. Check adjustment of 4.5 MC trap (A11). Check video IF alignment.

NEGATIVE PIX

Check by substitution V7, V8, V9 and V10. Check setting of the AGC threshold control. Check picture tube and other associated circuit components.

POOR CONTRAST

Check by substitution V1, V4, V5, V6, V7, V8 and V9. Check associated circuit components. Check picture tube.

SMEAR

Check by substitution V7, V8 and V9. Check L16, L20 and L21. Check C41, C43 and C44. Check R41, R42, R44 and R46 for change of value. Check picture tube and other associated components.

WIDE BLACK BAR ACROSS PIX

Check tuner, video IF, video detector and video amplifier tubes for heater to cathode leakage.

AUDIO

WEAK OR NO SOUND

Check by substitution V11, V12, V13, V14 and V15. Check stages of V14 and V15 using audio signed generator. Apply signal across R63.

If Satisfactory	If Unsatisfactory
Check ratio detector and audio IF alignment and components.	Check components associated with V14 and V15 especially C61.

BUZZ

Realign audio IF and ratio detector following procedure outlined in the alignment section. If buzz is still objectionable substitute V13 and readjust A9 and A10. Check C54 and C7.

DISTORTED

Follow procedure outlined under "Weak or No Sound".

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3924 MAIN ST.
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PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA		RTMA BASE TYPE	NOTES
		Wells-Gardner PART No.	STANDARD REPLACEMENT		
V1	UHF Oscillator	6AF4	6AF4	7DK	
V2A	RF Amplifier	6BQ7A	6BQ7A	9AJ	
B	RF Amplifier	6BZ7	6BZ7	9AJ	
V3	Converter	6J6	6J6	7BF	
V4	1st. Video IF Amp.	6CB6	6CB6	7CM	
V5	2nd. Video IF Amp.	6CB6	6CB6	7CM	
V6	3rd. Video IF Amp.	6CB6	6CB6	7CM	
V7	Video Detector-DC Restorer	6AL5	6AL5	6BT	
V8	Video Amplifier Sync Phase Inv.	12AT7	12AT7	9A	
V9	Video Output	6AH6	6AH6	7BK	
V10	AGC Keying	6AU6	6AU6	7BK	
V11	1st. Sound IF Amp.	6AU6	6AU6	7BK	
V12	Limiter	6AU6	6AU6	7BK	
V13	Ratio Detector	6AL5	6AL5	6BT	
V14	AF Amplifier-AGC Clamper	6AV6	6AV6	7BT	
V15	Audio Output	6AQ5	6AQ5	7BZ	
V16	Sync Separator	6BE6	6BE6	7CH	
V17	Vert. Oscillator - Vert. Output	6SN7GTA	6SN7GTA	8BD	
V18	Horiz. AFC	6AL5	6AL5	6BT	
V19	Horiz. Mult.	6SN7GTA	6SN7GTA	8BD	
V20	Horiz. Output	6BQ6GT	6BQ6GT	6AM	
V21	Damper	6AX4GT	6AX4GT	4CG	
V22	HV Rectifier	1B3GT	1B3GT	3C	
V23	LV Rectifier	5U4G	5U4G	5T	
V24	LV Rectifier	5U4G	5U4G	5T	

CATHODE-RAY TUBE

ITEM No.	REPLACEMENT DATA			RTMA BASE TYPE	NOTES
	Wells-Gardner PART No.	SYLVANIA PART No.	GENERAL ELECTRIC PART No.		
V25	21MP4	21MP4	21MP4	12C	

CAPACITORS

Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING		REPLACEMENT DATA							NOTES
	CAP.	VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	
C1A	▲80	400	45X390	AFH3-46		CO37		FP378	R1341	
B	▲60	400								
C2A	▲80	400	45X391	AFH3-142		C109		FP375	TVL-3764	
B	▲100	50								
C3	30	400	45X393	PRS450/30		BR3045A		TC77	TVA-1711	
C4	5	25	45X378	PRS150/4		BR550		TC30	TVA-1203	
C5A	■20	400	45X392	AFH3-137		CO97		FP366	TVL-3751	
B	▲10	400								
C	40	50								
C6	30	400	45X393	PRS450/30		BR3045A		TC77	TVA-1711	
C7	5	25	45X378	PRS150/4		BR550		TC30	TVA-1203	
C8	4	100	45X361	PRS150/4		BR415		TC40	TVA-1402	
C9	3-9		31B-207		829-10					
C10	1000		13D-153	EF-001	MFT-1000				503C-D1	
C11	3		CD8C3R6C	SI3NP0						
C12	.5-3		31B-206		829-3			CT565A		
C13	47		CD8Q470K	BPD-000047	D6-470		GP1K-470	UC-5447	5GA- Q47	
C14	1000		13D-196	EF-001	MFT-1000				503C-D1	
C15	1000		CD8X102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C16	1.5		CD8C1R5M	SI1.5NP0	TCZ-1.5		NP0K-1R5	ZT-5515	5TCCB-V15	
C17	1000		13D-153	EF-001	MFT-1000				503C-D1	
C18	47		CD8Q470K	BPD-000047	D6-470		GP1K-470	UC-5447	5GA-Q47	
C19	.5-3		31B-206		829-3			CT565A		
C20	10		CD10C100K	SI10NP0	TCZ-10		NP0K-100	ZT-541	5TCC-Q1	
C21	5		CD8U050C	SI5N750	TCN-5		N750K-050		5TCUB-V5	
C22	1000		CD8X102Z	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C23	6.8		CD8C6R8C	SI6.8NP0	TCZ-6.8		NP0K-6R8	ZT-5568	5TCCB-V68	
C24	1000		13D-153	EF-001	MFT-1000				503C-D1	
C25	1000		13D-153	EF-001	MFT-1000				503C-D1	
C26	120		13D-055	BPD-00012	D6-121	TM5T12	GP2K-121	UC-5312	5GA-T12	
C27	.22	200	RCP10M2224M	P488-22		PTE4P22		PT4025	2TM-P22	
C28A	1000		80X3	BPD-2X001	DD2-102	TM5DD1	812-001	DCD-521	5HK-2D1	
B	1000									
C29	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C30	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C31	.22	200	RC10M2224M	P488-22		PTE4P22		PT 4025	2TM-P22	
C32A	1000		80X3	BPD-2X001	DD2-102	TM5DD1	812-001	DCD-521	5HK-2D1	
B	1000									
C33	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C34	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C35	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C36	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C37	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C38	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C39	47		47X603	SI47	D6-470		GP1K-470	UC-5447	5GA-Q47	
C40	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	
C41	5		47X562	SI5NP0	TCZ-4.7		NP0K-050	ZT-555	5TCCB-V47	
C42	360	500	47X568							
C43	.047	400	RCP10M4473M	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C44	.1	400	RCP10M4104M	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C45	.047	600	RCP10M6473M	P688-047	DF-503	PTE6S47		PT6147	6TM-S47	
C46	.015	600	RCP10M6153M	P688-015		PTE6S15		PT6115	6TM-S15	
C47	.1	200	RCP10M2104M	P288-1	DF-104	PJ2P1		PT401	2TM-P1	
C48	1000		80X1	BPD-001	DD-102	TM5D1	801-001	DC-521	5HK-D1	

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PARTS LIST AND DESCRIPTIONS (Continued)

CAPACITORS (cont)

ITEM No.	RATING CAP.	RATING VOLT	Wells-Gardner PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C49	1.5		47X584	SIL.5NP0	TCZ-1.5		NPOK-1R5	ZT-5515	5TCCB-V15	
C50	5000		47X507	BPD-005	MD-502	TM5D5	81L-005	DC-525	5HK-D5	
C51	100		47X604	SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C52	5000		47X507	BPD-005	MD-502	TM5D5	81L-005	DC-525	5HK-D5	
C53	5000		47X507	BPD-005	MD-502	TM5D5	81L-005	DC-525	5HK-D5	
C54	1000		80X1	BPD-001	DD-102	TM5D1	80L-001	DC-521	5HK-D1	Note 1
C55	470	500	47X235	1469-0006		5RST3		MCB245	MS-35	
C56	.047	600	RCP10M2473M	P688-047	DF-503	PTE6S47		PT6147	6TM-S47	
C57	.0047	400	RCP10M4723M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C58	.0047	600	RCP10M4723M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C59	.01	400	RCP10M4103M	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C60	.047	400	RCP10M4473M	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C61A	.01									
B	250		†76X5	†PA-1123	†PC-80		†1404-01		†103C1	
C										
C62	.0047	600	RCP10M6472M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C63	.01	400	RCP10M4103M	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C64	5000		80X1	BPD-001	DD-102	TM5D1	80L-001	DC-521	5HK-D1	
C65	.047	400	RCP10M4473M	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C66A	.002					PTE6D2		PT6232		
B	.008		▲76X7	▲PA-110	▲PC-100	PTE6D5	▲1405-01	PT6235	▲101C1	
C	.006					PTE6D5		PT6235		
C67	4700	500	47X543	1464-005		DR5D5		MCB465	MS-35	
C68	.0047	400	RCP10M4472M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C69	100		47X604	SI100	D6-101	TM5T1	GP1K-101	UC-531	5GA-T1	
C70	.01	600	RCP10M6103M	P688-01	D6-103	PTE6S1	GP2-333-103	PT611	6TM-S1	
C71	.047	600	RCP10M6473M	P688-047		PTE6S47		PT6147	6TM-S47	
C72	.1	600	RCP10M6104M	P688-1	DF-104	PTE6P1		PT601	6TM-P1	
C73	.1	600	RCP10M6104M	P688-1	DF-104	PTE6P1		PT601	6TM-P1	
C74	1000		80X1	BPD-001	DD-102	TM5D1	80L-001	DC-521	5HK-D1	
C75	1000		80X1	BPD-001	DD-102	TM5D1	80L-001	DC-521	5HK-D1	
C76	.01	400	RCP10M4103M	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C77	270	500	RCM20A271K							
C78	.0047	400	RCP10M4473M	P688-0047	D6-472	PTE6D47	GP2-333-472	PT6247	6TM-D47	
C79	.22	200	RCP10M2224M	P488-22		PTE4P22		PT4025	2TM-P22	
C80	.047	200	RCP10M2473M	P288-047	DF-503	PTE4S47		PT4147	2TM-S47	
C81	4700	500	47X543	1464-005		DR5D5		MCB465	MS-35	
C82	430	500	RCM20B431K							
C83	.1	400	RCP10M4104M	P488-1	DF-104	PTE4P1		PT401	4TM-P1	
C84	330	500	47X570	1469-00025						
C85	200	500	RCM20A201K	1469-0002		5RST2		MCB237	MS-32	
C86	.047	400	RCP10M4473M	P488-047	DF-503	PTE4S47		PT4147	4TM-S47	
C87	1000		80X1	BPD-001	DD-102	TM5D1	80L-001	DC-521	5HK-D1	
C88	.1	400	RCP10M4104M	P488-1		PTE4P1		PT401	4TM-P1	
C89	.047	400	RCP10M4473M	P488-047		PTE4S47		PT4147	4TM-S47	
C90	.15	400	RCP10M4154M	P488-15		PTE4P15		PT4015	4TM-P15	
C91	.1	200	RCP10M4104M	P288-1	DF-104	PTE2P1		PT401	2TM-P1	
C92	500	20000	47X590		TV3-502	MM-C20TS	413-501	HV20035A	20DK-T5	
C93	56	1500	47X598		D15-560				20GA-Q56	
C94	10000		47X615	BPD-01	DD-103	TM5S1	81L-01	DC-511	5HK-S1	
C95	10000		47X615	BPD-01	DD-103	TM5S1	81L-01	DC-511	5HK-S1	

Note 1. When using Ratio Det. Transformer part #9A2295, C54 is 330MMF (part #47X570)

† Items C61A, C61B, C61C, R64A, R64B are combined in one unit.
When replacing items separately C61B and C61C should total 250MMF.

♦ Items C66A, C66B, C66C, R78A, R78B, R78C are combined in one unit.

CONTROLS

ITEM No	RATING RESISTANCE	RATING WATTS	Wells-Gardner PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1500Ω		78X12B	QJ-418*	RTV-405			Contrast - Panel
B	1Meg							Volume & Sw.-tapped ⓐ 250KΩ - rear
R2A	50KΩ		40X361-C	QII-123	AG-44-S	AB-31	U-35	Horiz. Hold
B	Shaft		Not Req.	NQ	RS-3/18	AK-4	DS-37	Attach to R2A
R3A	1Meg		40X336-E	QII-137	AG-61-S	AB-69	U-54	Tone
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R3A
R4A	500KΩ		40X333-A	QII-133	AG-58-S	AB-59	U-50	Brightness
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R4A
R5A	1Meg		40X334-E	QII-137	AG-61-S	AB-69	U-54	Vert. Hold
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R5A
R6A	150KΩ		40X331-A	QII-129	AG-51-S	AB-46	U-43	Horiz. Drive
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R6A
R7	7.5Meg		40X363-B					Sync Stability
R8A	4000Ω		40X368-B	QII-116	AG-80-S	AB-9	SU-14	Vert. Linearity
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R8A
R9A	2.5Meg		40X364	QII- 239	AG-84-S	AB-83	SU-565	Height
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R9A
R10A	2.5Meg		40X364	QII- 239	AG-84-S	AB-83	SU-569	AGC
B	Shaft		Not Req.	Not Req.	FKS-1/4	AK-1	Not Req.	Attach to R10A

* CONCENTRIKIT EQUIVALENT - KIT K-2, BASE ELEMENTS & SHAFTS B17-109 & P1-310 (Panel)
B13-137X & R2-322 (Rear) & SWITCH 76-2.

RESISTORS

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No.	IRC PART No.	NOTES
R11	15KΩ		12A-094		
R12	47KΩ		12A-039		
R13	100KΩ		12A-094	BTS-100K	
R14	100KΩ		12A-166	BTS-100K	
R15	160KΩ		12A-167		
R16	1500Ω		12A-183	BTS-1500Ω	
R17	10KΩ		12A-040		
R18	220KΩ		12A-041		
R19	10KΩ		12A-040	BTS-10KΩ	
R20	15KΩ		12A-040		
R21	8000Ω	5	43X279	1 3/4A-8000	
R22	12KΩ	2	D84123	BTB-12K	
R23	8200Ω 5%		B83822		
R24	47Ω		B83470	BTS-47	
R25	1000Ω		B85102	BTS-1000	
R26	1000Ω		B85102	BTS-1000	
R27	150Ω		B85151	BTS-150	
R28	22KΩ 5%		B82223		
R29	47Ω		B83470	BTS-47	
R30	1000Ω		B85102	BTS-1000	
R31	150Ω		B85151	BTS-150	
R32	2.7Meg		B84275	BTS-2.7Meg	
R33	470KΩ		B84474	BTS-470K	
R34	47KΩ		B84473	BTS-47K	
R35	330KΩ 5%		B83334	BTS-330K 5%	
R36	100KΩ		B84104	BTS-100K	
R37	22KΩ 5%		B83223		
R38	180Ω		B84181	BTS-180	

RESISTORS (cont)

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No.	IRC PART No.	NOTES
R39	1500Ω		B84152	BTS-1500	
R40	47000Ω 5%	1	B83472	BTS-4700 5%	
R41	5600Ω		C84562	BTA-5600	
R42	1500Ω		B84152	BTS-1500	
R43	33KΩ		B84333	BTS-33K	
R44	1Meg		B84105	BTS-1Meg	
R45	100Ω		B84101	BTS-100	
R46	47000Ω 5%	1	C83472	BTA-4700 5%	
R47	100KΩ		B85104	BTS-100K	
R48	1Meg		B84105	BTS-1Meg	
R49	22KΩ		B84223	BTS-22K	
R50	100KΩ		B85104	BTS-100K	
R51	47KΩ		B85473	BTS-47K	
R52	100Ω		B84101	BTS-100	
R53	1000Ω		B85102	BTS-1000	
R54	56KΩ		B84563		
R55	100KΩ		B84104	K	
R56	1000Ω		B85102	BTS-1000	
R57	33KΩ		B84333	BTS-33K	
R58	270Ω		B84271	BTS-270	
R59	68KΩ		B84683	BTS-68K	
R60	22KΩ		B84223	BTS-22K	
R61	22KΩ		B84223	BTS-22K	
R62	68KΩ		B84683	BTS-68K	
R63	10Meg		B85106	BTS-10Meg	
R64A	470KΩ		†76X5	BTS-470K	
B	470KΩ			BTS-470K	
R65	47KΩ		B85473	BTS-47K	
R66	330Ω	1	C84331	BTA-330	
R67	1000Ω	2	B84102	BTS-1000	
R68	47KΩ		B84473	BTS-47K	
R69	10KΩ		B84103	BTS-10K	
R70	270KΩ		B84274	BTS-270K	
R71	1.5Meg		B84155	BTS-1.5Meg	
R72	68KΩ		B84683	BTS-68K	
R73	820KΩ		B84824	BTS-820K	
R74	22000Ω 5%		B83222	BTS-2200 5%	
R75	3300Ω		B84332	BTS-3300	
R76	22000Ω 5%		B83222	BTS-2200 5%	
R77	1000Ω	1	C84102	BTA-1000	

† Items R64A, R64B, C61A, C61B, C61C are combined in one unit.
♦ Items R78A, R78B, R78C, C66A, C66B, C66C are combined in one unit.

ITEM No.	RATING OHMS	RATING WATT	Wells-Gardner PART No.	IRC PART No.	NOTES
R78A	22KΩ			BTS-22K	
B	8200Ω		▲76X7	BTS-8200	
C	8200Ω			BTS-8200	
R79	1.8Meg		B84185	BTS-1.8Meg	
R80	470KΩ		B85474	BTS-470K	
R81	1.8Meg		B84185	BTS-1.8Meg	
R82	2.2Meg		B84225	BTS-2.2Meg	
R83	180KΩ		B84184	BTS-180K	
R84	10KΩ		B84103	BTS-10K	
R85	2.2Meg		B84225	BTS-2.2Meg	
R86	820Ω		B84821	BTS-820	
R87	2200Ω		B84222	BTS-2200	
R88	6800Ω	2	D84682	BTS-6800	
R89	560Ω		B84561	BTS-560	
R90	560Ω		B84561	BTS-560	
R91	1000Ω		B85102	BTS-1000	
R92	100KΩ		B84104	BTS-100K	
R93	100KΩ		B84104	BTS-100K	
R94	4.7Meg		B85475	BTS-4.7Meg	
R95	470KΩ		B85474	BTS-470K	
R96	27KΩ		B84273	BTS-2700	
R97	6800Ω	1	C84682	BTA-6800	
R98	6800Ω	1	C84682	BTA-6800	
R99	33KΩ		B84333	BTS-33K	
R100	22000Ω 5%		B83222	BTS-2200 5%	
R101	56000Ω 5%		C83562	BTA-5600 5%	
R102	150KΩ 5%		B83154	BTS-510K 5%	
R103	220KΩ 5%		B83224	BTS-220K 5%	
R104	47KΩ		B84473	BTS-47K	
R105	5600Ω		B84562	BTS-5600	
R106	470KΩ		B84472	BTS-470K	
R107	100Ω	2	D84101	BW-2-100	
R108	12KΩ	5	43X276	1 3/4A-12K	
R109	5.1Ω		47X339		
R110	1Meg	1	C85105		
R111	100KΩ	2	D85104	BTB-100K	
R112	10KΩ	5	43X272	1 3/4A-10K	
R113	1500Ω	15	43X275	2D-1500	
R114	330Ω	10	43X273	1 3/4A-350	
R115	270KΩ		B85274	BTS-270K	

TRANSFORMER (POWER)

ITEM No.	RATING PRI.	RATING SEC 1	RATING SEC 2	RATING SEC. 3	Wells-Gardner PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	RCA TYPE No.
T1	117VAC ⓐ 2A	582VCT .370ADC	5VAC ⓑ 6A	6.3VAC ⓒ 1.2A SEC. 4 6.3VAC ⓓ 8.5A	53X333					

TRANSFORMER (SWEEP CIRCUITS)

ITEM No.	RATING DC RESISTANCE PRI.	RATING DC RESISTANCE SEC.	Wells-Gardner PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	RCA TYPE No.	NOTES
T2	190Ω	1100Ω	54X8	A-8125	A-3003	TBD-5	A-97X	209T1 ⑤	Vert.Osc.Trans.
T3	469Ω tap ⓐ-.5Ω, 70, 140, 230, 39Ω	3.5Ω SEC. 2 0Ω	53X330		HVO-9① ② & MWC-1	TFB-18② ③ & TW-8	D-23③ ④ & WC-11	233T1 ⑫ & 212R1	Horiz.Output Trans.
T4	1500Ω tap ⓐ-4.4Ω		51X156	A-8123⑤	A-3037 ⑤	TSO-8 ⑤ ⑥	A-102X ⑤	222T1 ⑤	Vert.Output Trans.
T5A	33Ω		9A2274	DY-8A⑦	MDF-72	TY-3 ⑧	Y-17	21ID2	Horiz.Deflection Coils
B	47Ω								Vert. Deflection Coils
T6	15Ω		9A2262		MWC-8	TW-7	WC-12⑨	213R1	Horiz. Linearity Coil
T7	.8Ω		9A2183	WC-4⑩	MWC-2 ⑩ ⑪	TW-3 ⑩ ⑪		30R4 ⑬	Width Coil

① Drill new mounting holes.
② Connect original terminal #6 to new terminal #9, original #5 to new #7, original #4 to new #5, original #1 to new #1. Connect primary of MWC-1 across terminals 3 and 1 and secondary to AFC (If picture is out of phase, reverse secondary).
③ Connect terminal #8 to terminal #7, then connect original #6 to new #9, original #5 to new #7 and 8, original #4 to new #5, original #1 to new #1. Connect primary of TW-8 across terminals 3 and 1 and secondary to AFC (If picture is out of phase, reverse secondary).
④ Connect terminal #8 to terminal #7, then connect original #6 to new #9, original #5 to new terminal 7 and 8, original #4 to new #5, original #1 to new #3. Connect primary of WC-11 across terminals 3 and 1 and secondary to AFC (If picture is out of phase, reverse secondary)
⑤ Drill one new mounting hole.
⑥ Connect as auto transformer.
⑦ Use original horizontal deflection coil network if necessary.
⑧ Use original horizontal deflection coil network.
⑨ Connect to coded blue and green terminals.
⑩ Bend clip or use original slider and core.
⑪ Enlarge mounting hole.
⑫ Use Fig. 4 of instruction booklet packed with unit for terminal connections.

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING IMPEDANCE PRI.	RATING IMPEDANCE SEC.	RATING DC RES. PRI.	RATING DC RES. SEC.	Wells-Gardner PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	NOTES
T8	5.8KΩ	3.6Ω	450Ω	.85Ω	51X150H	A-3877	A-2930	RO-9 ①	S-3X	① Drill one new mounting hole.

SPEAKER

ITEM No.	RATINGS SIZE	RATINGS FIELD	RATINGS V C. IMP	Wells-Gardner PART No.	VIKING PART No.	QUAM PART No.	NOTES
SP1	10"	PM	3.6Ω	12A480 ① 12A504 ② 12A502 ②	10J11	10A31	① 8" PM speaker, not used in all Models. ② 12" PM speaker used in console Models.

COILS (RF-IF)

ITEM No.	USE	DC RES. PRI.	DC RES. SEC.	Wells-Gardner PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	NOTES
L1A	Ant. Coil	0Ω CT	0Ω	A9A2297-2				Channel 2
B	Ant. Coil	0Ω CT	0Ω	A9A2297-3				Channel 3
C	Ant. Coil	0Ω CT	0Ω	A9A2297-4				Channel 4
D	Ant. Coil	0Ω CT	0Ω	A9A2297-5				Channel 5
E	Ant. Coil	0Ω CT	0Ω	A9A2297-6				Channel 6
F	Ant. Coil	0Ω CT	0Ω	A9A2297-7				Channel 7
G	Ant. Coil	0Ω CT	0Ω	A9A2297-8				Channel 8
H	Ant. Coil	0Ω CT	0Ω	A9A2297-9				Channel 9
I	Ant. Coil	0Ω CT	0Ω	A9A2297-10				Channel 10
J	Ant. Coil	0Ω CT	0Ω	A9A2297-11				Channel 11
K	Ant. Coil	0Ω CT	0Ω	A9A2297-12				Channel 12
L	Ant. Coil	0Ω CT	0Ω	A9A2297-13				Channel 13
L2	Fil.Choke	0Ω		34A-546				
L3	Neutr.Coil	0Ω		31B-298				
L4A	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-2				Channel 2
B	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-3				Channel 3
C	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-4				Channel 4
D	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-5				Channel 5
E	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-6				Channel 6
F	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-7				Channel 7
G	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-8				Channel 8
H	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-9				Channel 9
I	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-10				Channel 10
J	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-11				Channel 11
K	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-12				Channel 12
L	RF, Mixer Grid & Osc. Coil	0Ω		A9A2298-13				Channel 13
L5	Fil. Choke	0Ω		34A-575				
L6	RF Choke	0Ω		31B-295				
L7	1st. Video IF	1Ω		31A-078				
L8	RF Choke	1.2Ω		31B-230				
L9	Fil. Choke	0Ω		9A2033	19-3001	TV-189	4602	1 Microhenry
L10	2nd. Video IF	.3Ω	.3Ω	9A2230	17-1063		6249	
L11	Fil. Choke	0Ω		9A2033	19-3001	TV-189	4602	1 Microhenry
L12	3rd. Video IF	.3Ω	.3Ω	9A2230	17-1064		6250	
L13	Fil. Choke	0Ω		9A2033	19-3001	TV-189	4602	1 microhenry
L14	RF Choke	2.5Ω		9A1979	19-3036	TV-180	4628	36 Microhenries
L15	4th. Video IF	.3Ω		9A2226		TV-181	6187	Includes trap
L16	Series Peaking Coil	7Ω		36A10	19-4060	TV-180 †	6172 †	60 Microhenries, wound on 32KΩ resistor
L17	Shunt Peaking Coil	25Ω		36A11	19-3500	TV-186	6174	500 Microhenries
L18	4.5MC Trap	.3Ω		9A2074	20-1004	TV-151	1470	
L19	Series Peaking Coil	2.5Ω		9A1979	19-3036	TV-180	6178	36 Microhenries
L20	Shunt Peaking Coil	9Ω		36A16	19-3075 ▲	TV-181a	6172 ▲	80 Microhenries, wound on 1.5KΩ resistor
L21	Series Peaking Coil	15Ω		36A12	19-4180	TV-184 †	4644 †	180 Microhenries, wound on 22KΩ resistor
L22	Shunt Peaking Coil	14Ω		36A2	19-3180	TV-184	6180	190 Microhenries
L23	1st. Sound IF	2.5Ω		9A2168	17-1031 ▲	TV-113 †	1470A ■	
L24	2nd. Sound IF	1.5Ω	1.5Ω	9A2170		TV-113	6203	
L25	Ratio Det.	3.5Ω	.65CT	9A2269 *	17-1033	TV-119	1468	Tertiary winding-.2Ω
L26	Horiz.Osc.	70Ω		9A2096	19-1576	TV-183	6210	

* Some Models use Ratio Det. part #9A2295 (has numerical terminal identification)
Ratio Det. (part #9A2269) has alphabetical terminal identification)
† Parallel with 22KΩ resistor
▲ Parallel with 1.5KΩ resistor
■ Drill mounting holes
♦ Detune unwired winding
● Add 47MMF Cap. externally

MODELS 321MS39-322, -372-2, -376-2, 2321MS39-324, -370, -396-1
WELLS GARDNER

PARTS LIST AND DESCRIPTIONS (Continued)

FILTER CHOKE

ITEM No.	RATINGS			REPLACEMENT DATA				
	TOTAL DIRECT CURRENT	D. C. RESISTANCE	INDUCTANCE (0 CURRENT 1000 ∿)	Wells-Gardner PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.
L27	.270ADC	42Ω	1.68 Hy.	52X91	C-2326 ①	C-2996 ①	TR-1733 ①	C-17X ①

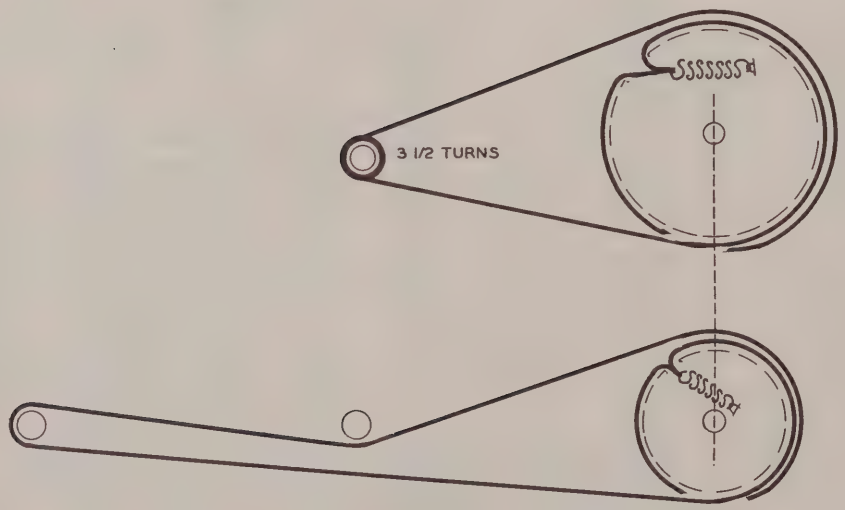
① Drill one new mounting hole.

FUSES

ITEM No.	TYPE	RATING	REPLACEMENT DATA					
			Wells-Gardner PART No.		LITTELFUSE PART No.		BUSS PART No.	
			FUSE	HOLDER	FUSE	HOLDER	FUSE	HOLDER
M1	3AG S/B	4/10A 125V	16X147-3	16X146	313.400 (4/10A-125V)	357001	MDL4/10	4405

MISCELLANEOUS

ITEM No.	PART NAME	Wells-Gardner PART No.	NOTES
M2	Dial Light	7A32	Type #51 - Channel Indicator
M3	Dial Light	7A32	Type #51 - UHF Dial
M4	VHF Tuner	25A-1104	
M5	UHF Tuner	25A-1105	
M6	Trap, UHF Filter		
M7	Crystal		1N72 (1N82 may be used) UHF tuner
M8	Magnet	2A426	Focus and centering
M9	Magnet	2A407	Ion Trap
	Back Cover	S-14X69	
	Dial Glass	58X768	UHF
	Knob	10A820-1	Fine tuning (Maroon)
	Knob	10A821-1	Contrast (Maroon) — Models 321MS39-322, 321MS39-372-2,
	Knob	10A822-1	Channel Selector (Maroon) — 321MS39-376-1
	Knob	10A779	Volume (Maroon)
	Knob	10A820-2	Fine tuning (Beige)
	Knob	10A821-3	Contrast (Beige) — Models 2321MS39-324, 2321MS39370,
	Knob	10A822-3	Channel Selector (Beige) — 2321MS39-396-1
	Knob	10A812-4	Volume (Beige)



UHF DIAL CORD STRINGING

TROUBLE SHOOTING AIDS (cont)

PROPERTY OF
L. F. SHANKENSHIP
DENVER, COLORADO

POWER

DEAD SET

If filaments fail to light check AC interlock assembly, switch on volume control and T1. If filaments light check M1, V23, V24 and B+ filter and decoupling network components.

SMALL PIX AND / OR DIM RASTER

Substitute V23 and V24. Check B+ filter and decoupling network components.

HIGH VOLTAGE

LOSS OF HIGH VOLTAGE

Check by substitution V19, V20, V21 and V22. Check waveform W17.

If Satisfactory	If Unsatisfactory
Check R109, R110, C92, T3, T5A and other associated components.	Check C82, C84, C85, R103, R104, R106 and other associated components.

INSUFFICIENT HIGH VOLTAGE

Check by substitution V19, V20, V21, V22, V23 and V24. Check picture tube and associated components.

BLOOMING

Check by substitution V19, V20, V21, V22, V23 and V24. Check R109, R110, C92, T3, T5A, picture tube and other associated components.

GENERAL

RASTER SOUND NO PIX

See "Loss of Video".

RASTER NO SOUND NO PIX (VHF)

Substitute V1, V2, V4, V5, V6 and V7. Check associated components.

RASTER NO SOUND NO PIX (UHF)

Substitute V1, V2, V3, V4, V5, V6 and V7. Check associated components. NOTE! It may be necessary to try several tubes in the UHF tuner to find one that will operate satisfactory.

NO RASTER NO SOUND

See "Dead Set".

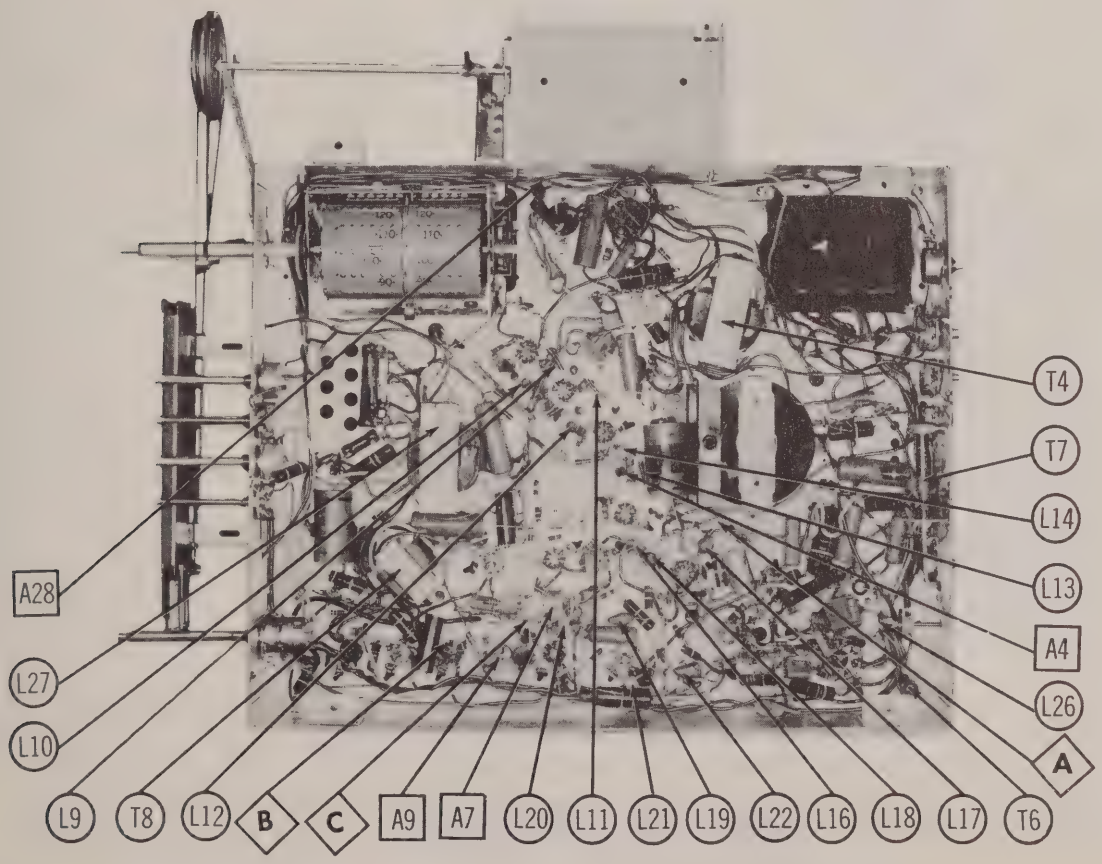
TOTAL LOSS OF SYNC

Check by substitution V16 and V8. Check associated components.

INTERMITTENT STREAKS

Check high voltage section for corona discharge and arcing.

Symptoms shown are assumed and are not indicative of the quality and workmanship of this receiving equipment.



CHASSIS BOTTOM VIEW-TRANS., INDUCTOR & ALIGN. IDENTIFICATION

SERVICING IN THE FIELD

TUNER OSCILLATOR ADJUSTMENTS

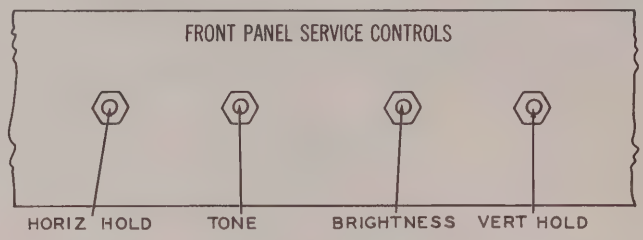
Touch-up adjustments of the RF tuner oscillator circuit may be accomplished by removal of the channel selector and fine tuning knobs. The adjustments are accessible, one at a time, through the small hole in the cabinet to the right of the channel selector shaft.

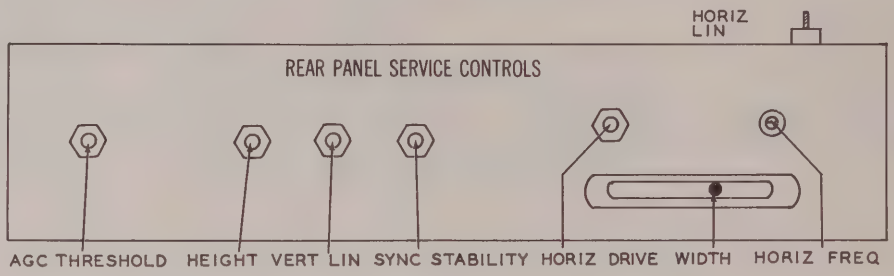
PICTURE TUBE SAFETY GLASS CLEANING

To clean safety glass remove 4 wood screws holding wood strip at bottom of safety glass. Remove wood strip and safety glass. Use extreme caution when removing safety glass.

PICTURE TUBE REMOVAL

For picture tube removal it is necessary to remove chassis. (See disassembly instructions).





SPECIAL ADJUSTMENTS - SYNC STABILITY CONTROL

Tune set to strongest TV signal available turn the sync stability control clockwise until bending of the picture occurs at the top, then turn counter clockwise until the bending just disappears.

AGC THRESHOLD CONTROL - Tune in strongest TV signal . Turn the control clockwise until overloading appears. turn control counter clockwise until overloading disappears.

HORIZONTAL OSCILLATOR FIELD ADJUSTMENT

Adjustment of the horizontal oscillator circuit can be made from the rear panel of the chassis. Set the horizontal hold control at the mid-position of its range and adjust the horizontal frequency slug (L26) until the picture synchronizes horizontally.

SOUND IF DETECTOR BUZZ ADJUSTMENT

To eliminate Sound IF detector buzz, adjust the ratio detector secondary (L25) located on top of chassis. (See tube placement chart).

FUSES

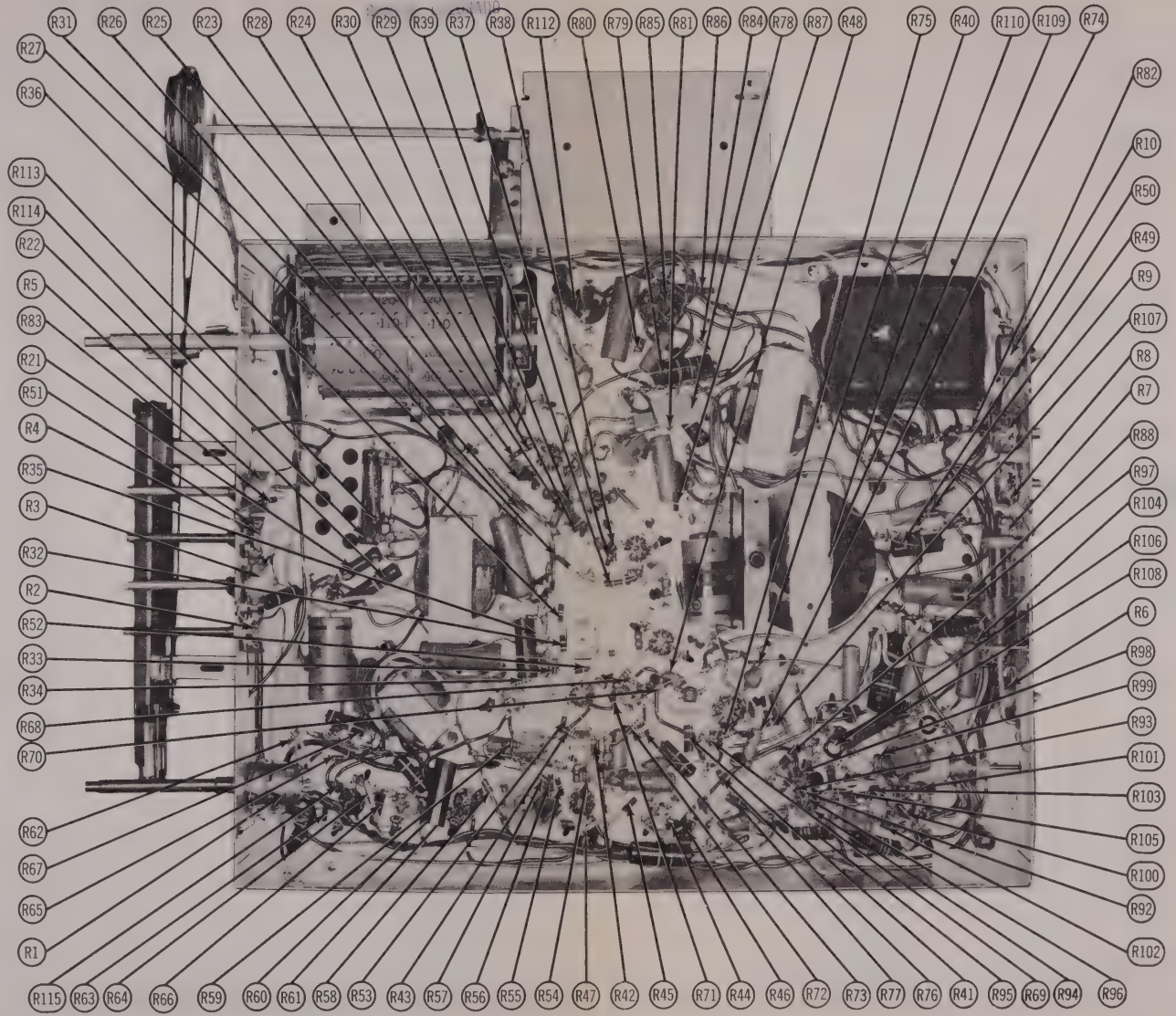
One fuse is used for LV power supply protection. (For location, see tube placement chart).

CENTERING

Centering is accomplished mechanically by adjusting a magnetic ring around the neck of the picture tube located flush against the yoke. Turn the disk-like knob and at the same time rotate the ring around the tube until picture is properly centered.

DISASSEMBLY INSTRUCTIONS

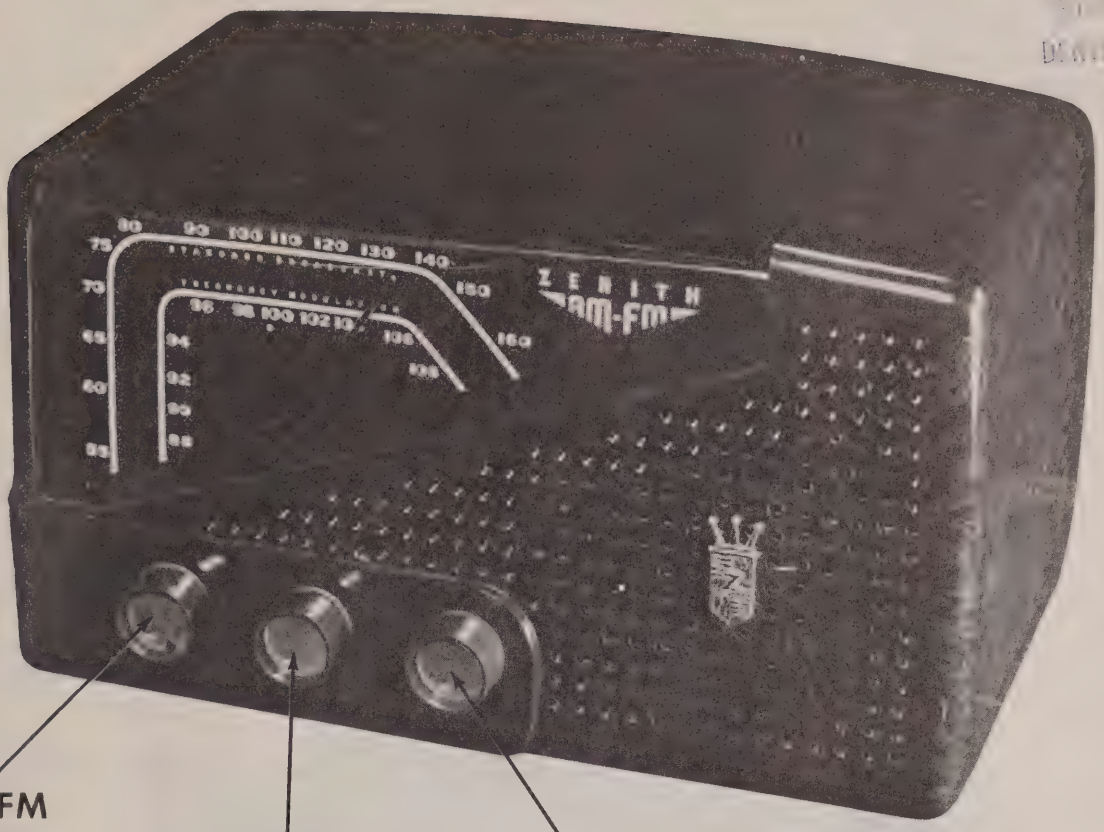
1. Remove 4 push on type control knobs from front panel.
2. Remove 2 wood and 2 metal screws. Remove rear cover.
3. Disconnect VHF built-in antenna. Loosen 4 wood screw. Remove VHF and UHF antenna bracket.
4. Disconnect speaker. Remove 4 speaker nuts. Remove speaker.
5. Remove 5 chassis bolts. Remove chassis.



CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L F [illegible]
DENVER, COLORADO

ZENITH
MODEL L721 (Ch. 7L05)



ZENITH
MODEL L721 (Ch. 7L05)

TRADE NAME	Zenith Model L721 (Ch. 7L05)	
MANUFACTURER	Zenith Radio Corp., 6001 Dickens Ave., Chicago, Ill.	
TYPE SET	AC-DC Operated AM-FM Superheterodyne Receiver	
TUBES (Seven)	Types 6BJ6 FM RF Amp., 12AT7 Conv., (2) 12BA6 IF Amp., 12AU6 Limiter, 19T8 Discriminator -AM Det.-AVC-AF Amp., 35C5 Audio Output	
POWER SUPPLY	110-120 Volt AC-DC	RATING .28 Amp. @ 117 Volts AC
TUNING RANGE-BROADCAST	540-1620KC	FREQ. MOD. 88-108MC

HOWARD W. SAMS & CO., INC. • Indianapolis 5, Indiana

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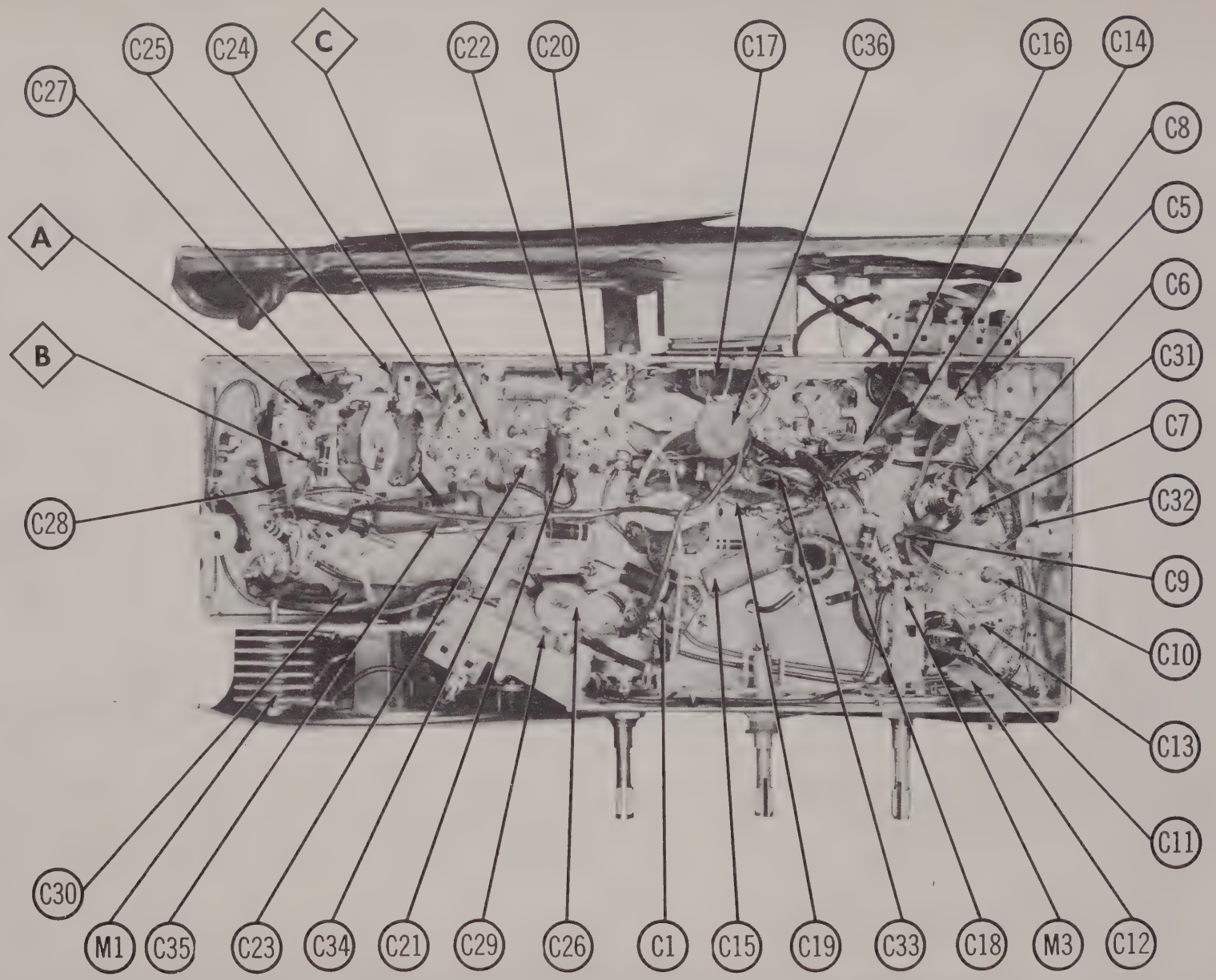
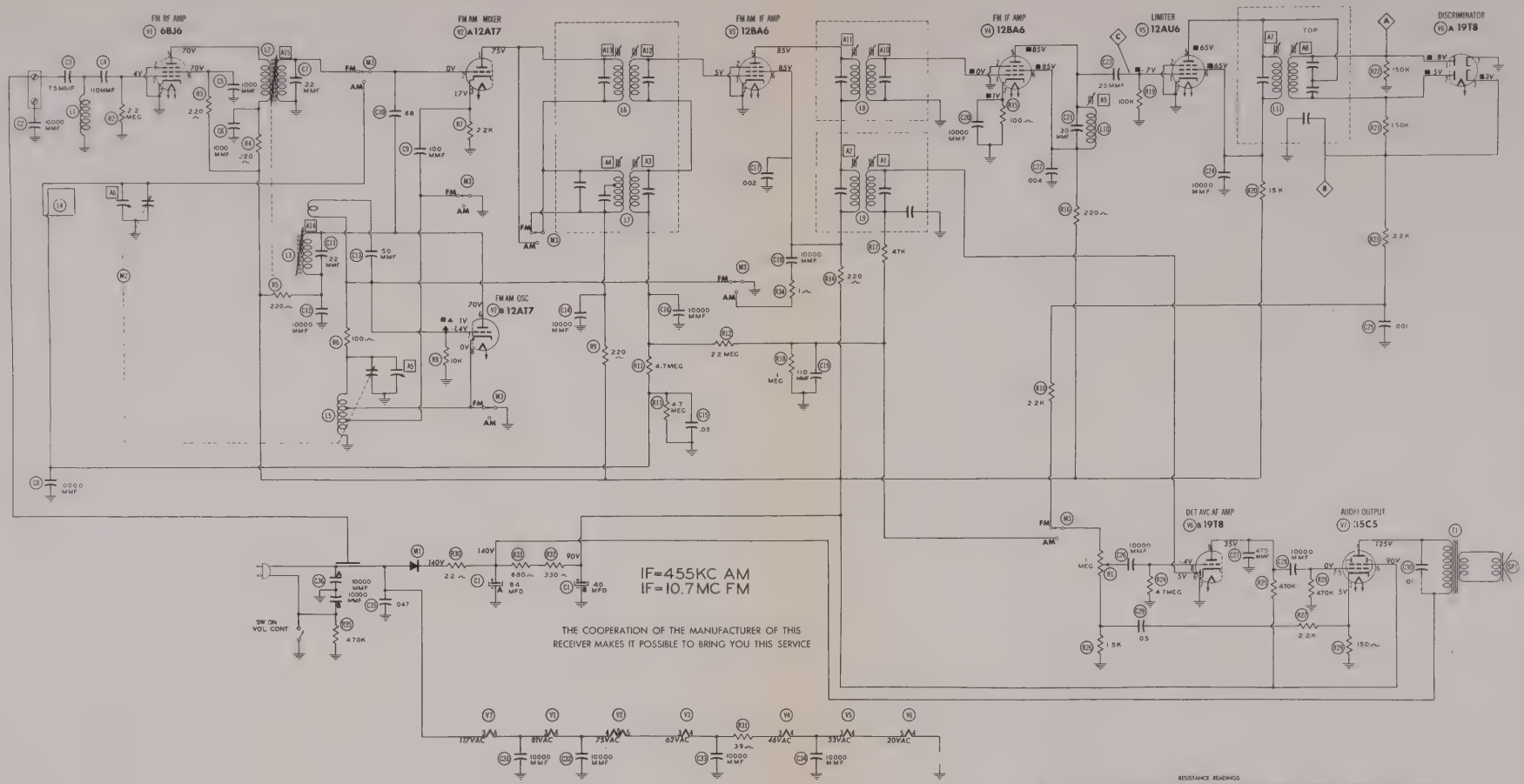


CHASSIS BOTTOM VIEW-CAPACITOR IDENTIFICATION



RESISTANCE READINGS

Item	Tube	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8	Pin 9
V 1	6BJ6	2.2Meg	0Ω	100Ω	95Ω	↑ 1.3KΩ	↑ 1.3KΩ	0Ω		
V 2	12AT7	↑1.2KΩ ≡ 140Ω	1Meg ≡0Ω	2.2KΩ	95Ω	↑ 85Ω	↑ 1.3KΩ	10KΩ	2.5Ω ≡0Ω	0Ω
V 3	12BA6	1.99Meg ≡ 2.49Meg	0Ω	85Ω	75Ω	↑ 1.3KΩ	↑1.3KΩ	0Ω		
V 4	12BA6	.5Ω	0Ω	37Ω	28Ω	↑1.3KΩ	↑1.3KΩ	100Ω		
V 5	12AU6	100KΩ	0Ω	28Ω	18Ω	↑ 16KΩ	↑18KΩ	0Ω		
V 6	19T8	150KΩ ≡ 140KΩ	150KΩ ≡140KΩ	300K ≡230K	0Ω	18Ω	550KΩ ≡1.1Meg	0Ω	4.7Meg	↑ 470KΩ
V 7	35C5	160Ω	470KΩ	130Ω	100Ω	470KΩ	↑ 1KΩ	↑ 300Ω		

ALL MEASUREMENTS TAKEN IN STANDARD BC POSITION UNLESS OTHERWISE NOTED.
≡ TAKEN IN "FM" POSITION
↑ MEASURED FROM OUTPUT OF M1

1- DC voltage measurements are at 20,000 ohms per volt, AC voltages measured at 1000 ohms per volt.
2- S socket connections are shown as bottom views.
3- Measured values are from socket pin to common negative.
4- Line voltage maintained at 117 volts for voltage readings.
5- Nominal tolerance on component values makes possible a variation of ± 15% in voltage and resistance readings.
6- Volume control at maximum, no signal applied for voltage measurements.

A PHOTOFACT STANDARD NOTATION SCHEMATIC
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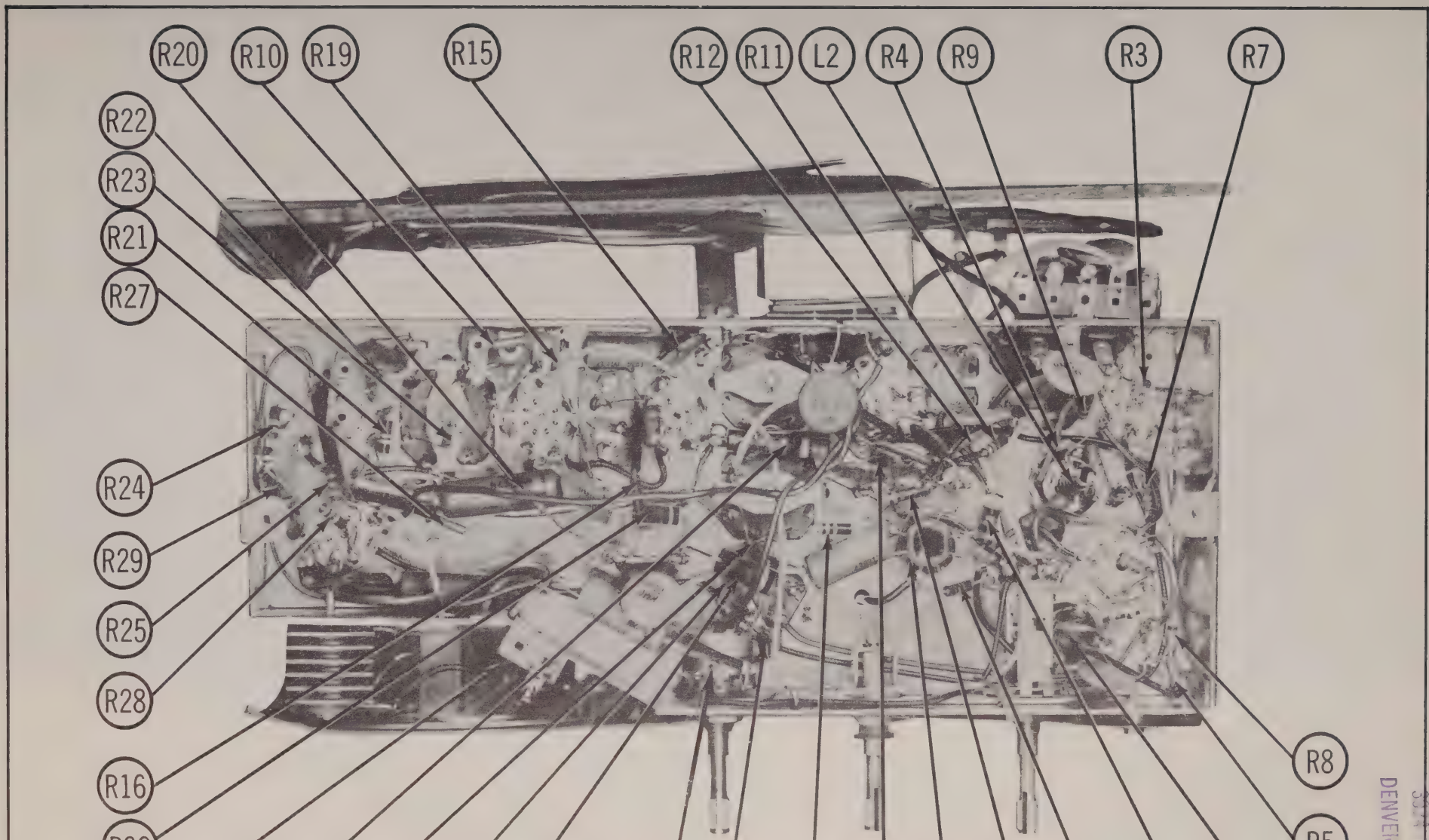


CHASSIS BOTTOM VIEW-RESISTOR IDENTIFICATION

PROPERTY OF
L. F. ELLINGSHIP
3314 INCA ST.
DENVER, COLORADO

ALIGNMENT INSTRUCTIONS

ALIGNMENT INSTRUCTIONS—READ CAREFULLY BEFORE ATTEMPTING ALIGNMENT

Use isolation transformer, if available. If not, connect a .1MFD capacitor in series with low side of signal generator and chassis.
Volume control should be at maximum position. Output of signal generator should be no higher than necessary to obtain an output reading.
With tuning gang fully closed set dial pointer at edge of white line below "55" on the dial.
Use Zenith tuning wrench 68-19 or equivalent for making IF transformer adjustments.

AM ALIGNMENT

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
1.	.05MFD	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	455KC (400~Mod)	AM	600KC	Across voice coil	A1, A2, A3, A4	Adjust for maximum output. If isolation transformer is not used, reduce dummy antenna to .001MFD to reduce hum modulation.
2.		Loop	1600KC	"	1600KC	"	A5	Fashion loop of several turns of wire and radiate signal into loop of receiver. Adjust for maximum output.
3.		"	1400KC	"	Tune to 1400KC signal	"	A6	"

SOUND IF ALIGNMENT USING AM SIGNAL GENERATOR AND VTVM

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (grid) of 12AU6 (V5). Low side to chassis.	10.7MC (Unmod.)	FM	Point of non-interference	DC probe thru 2Meg to point (A). Common to chassis.	A7	Adjust for maximum deflection.
5.	"	"	"	"	"	DC probe thru 2Meg to point (B). Common to chassis.	A8	Adjust for zero reading. A positive and negative reading will be obtained on either side of the correct setting.
6.	"	High side to pin 1 (grid) of 12BA6 (V4). Low side to chassis.	"	"	"	DC probe thru 2Meg to point (C). Common to chassis.	A9	Adjust for maximum deflection.
7.	"	High side to pin 1 (grid) of 12BA6 (V3). Low side to chassis.	"	"	"	"	A10, A11	"
8.	"	High side to pin 2 (grid) of 12AT7 (V2) Low side to chassis.	"	"	"	"	A12, A13	"

SOUND IF ALIGNMENT USING FM SIGNAL GENERATOR AND OSCILLOSCOPE

Use frequency modulated signal with 60~ modulation and 450KC sweep. Use 120~ sawtooth voltage in scope for horizontal deflection.
Connect the synchronized sweep voltage from the sweep generator to the horizontal input of the oscilloscope for horizontal deflection.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT SCOPE	ADJUST	REMARKS
4.	.05MFD	High side to pin 1 (grid) of 12AU6 (V5). Low side to chassis.	10.7MC (450KC Swp)	FM	Point of non-interference	High side thru 22KΩ to point (A). Low side to chassis.	A7	Adjust for maximum amplitude and symmetry similar to Fig. 1.
5.	"	"	"	"	"	High side thru 22KΩ to point (B). Low side to chassis.	A8	Adjust so that 10.7MC occurs at center of crossover lines as in Fig. 2. SLIGHTLY retouch A7 for maximum amplitude and straightness of crossover lines.
6.	"	High side to pin 1 (grid) of 12BA6 (V4). Low side to chassis.	"	"	"	High side thru 22KΩ to point (C). Low side to chassis.	A9	Adjust for maximum amplitude and symmetry similar to Fig. 1.
7.	"	High side to pin 1 (grid) of 12BA6 (V3). Low side to chassis.	"	"	"	"	A10, A11	"
8.	"	High side to pin 2 (grid) of 12AT7 (V2). Low side to chassis.	"	"	"	"	A12, A13	

FM RF ALIGNMENT

Remove line antenna.
Loosen the oscillator and detector slugs by applying a hot iron to the cement.

	DUMMY ANTENNA	SIGNAL GENERATOR COUPLING	SIGNAL GENERATOR FREQUENCY	BAND SWITCH POS.	RADIO DIAL SETTING	CONNECT VTVM	ADJUST	REMARKS
9.	270Ω Carbon Resistor	High side to antenna terminal "F". Low side to antenna terminal "G"	98MC (Unmod.)	FM	98MC	DC probe thru 2Meg to point (C). Common to chassis.	A14	Adjust for maximum deflection.
10.	"	"	"	"	"	"	A15	"

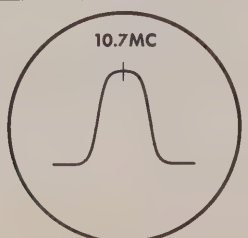


FIG. 1

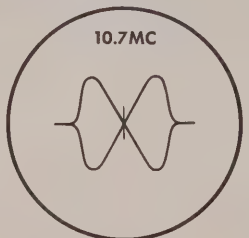


FIG. 2

PARTS LIST AND DESCRIPTIONS

TUBES (SYLVANIA, GENERAL ELECTRIC or Equivalent)

ITEM No.	USE	REPLACEMENT DATA: ZENITH PART No.	REPLACEMENT DATA: STANDARD REPLACEMENT	RTMA BASE TYPE	NOTES
V1	FM RF Amplifier	6BJ6	6BJ6	7CM	
V2	Converter	12AT7	12AT7	9A	
V3	FM AM IF Amp.	12BA6	12BA6	7BK	
V4	FM IF Amplifier	12BA6	12BA6	7BK	
V5	Limiter	12AU6	12AU6	7BK	
V6	Discriminator-AM Detector-AVC-AF Amplifier	19T8	19T8	9E	
V7	Audio Output	35C5	35C5	7CV	

CAPACITORS

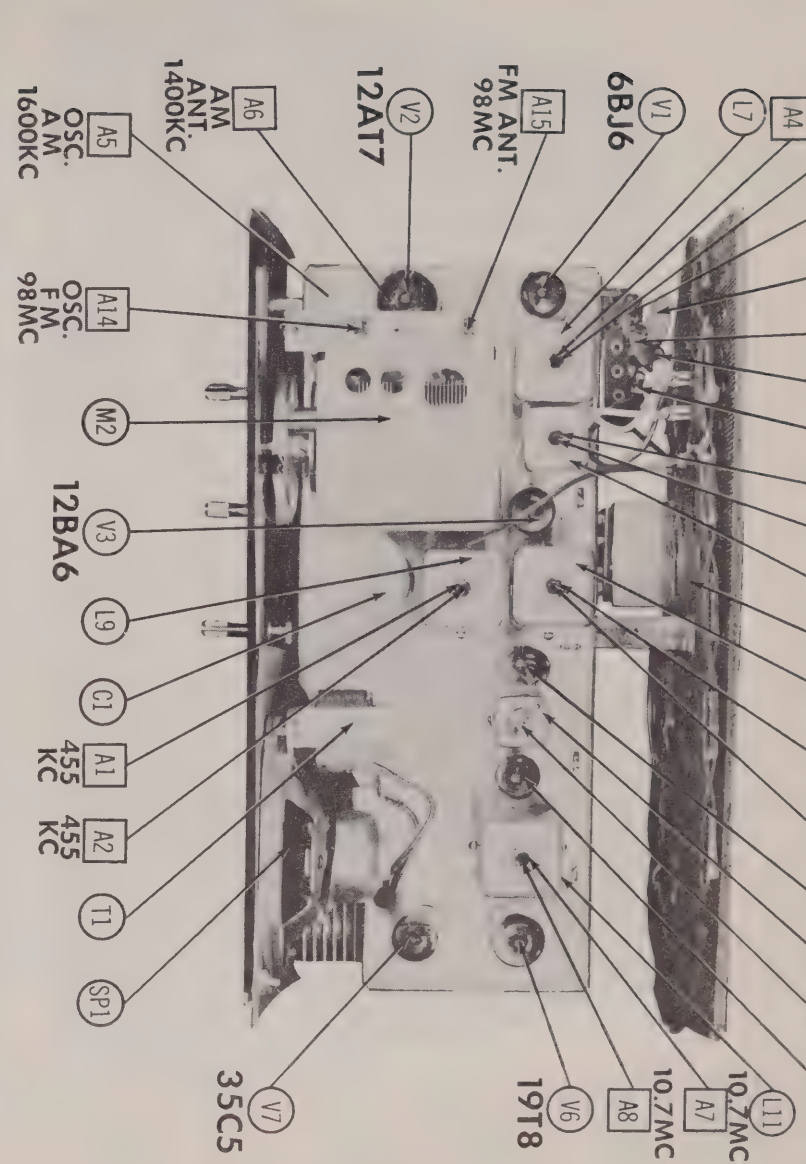
Capacity values given in the rating column are in mfd. for Electrolytic and Paper Capacitors, and in mmfd. for Mica and Ceramic Capacitors.

ITEM No.	RATING CAP.	RATING VOLT	REPLACEMENT DATA: ZENITH PART No.	AEROVOX PART No.	CENTRALAB PART No.	CORNELL-DUBILIER PART No.	ERIE PART No.	MALLORY PART No.	SPRAGUE PART No.	NOTES
C1A	■80	150	22-1757	AFH2-19		BO18		FP216		
B	▲40	150								
C2	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C3	7.5		22-1852							
C4	110		22-5							
C5	1000		12-1676	SI1000	D6-102	TM5D1	GP2L-102	UC-521	5GA-D1	
C6	1000		12-1676	SI1000	D6-102	TM5D1	GP2L-102	UC-521	5GA-D1	
C7	22		22-1506	SI22	D6-220		GP1K-220	UC-5422	5GA-Q22	
C8	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C9	1000		12-1676	SI1000	D6-102	TM5D1	GP2L-102	UC-521	5GA-D1	
C10	.68		22-1766							
C11	22		22-1506	SI22	D6-220		GP1K-220	UC-5422	5GA-Q22	
C12	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C13	50		22-1367	SI50	D6-500	TM5Q5	GP1K-500	UC-545	5GA-Q5	
C14	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C15	.05	200	22-829	P288-05	DF-503	PTE4S5		PT415	2TM-S5	
C16	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C17	.002	600	22-1220	P688-002	D6-202	PTE6D2	GP2-333-202	PT622	6TM-D2	
C18	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C19	110		22-5							
C20	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C21	30		22-1768	SI30			GP1K-300		5GA-Q3	
C22	.004	600	22-448	P688-004	D6-402	PTE6D4	GP2-333-402	PT624	6TM-D4	
C23	25		22-1507							
C24	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C25	.001	600	22-887	P688-001	D6-102	PTE6D1	GP2L-102	PT621	6TM-D1	
C26	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C27	470		22-6	BPD-00047	D6-471	TM5T5	GP2K-471	UC-5347	5GA-T47	
C28	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C29	.05	200	22-1158	P288-05	DF-503	PTE4S5		PT415	2TM-S5	
C30	.01	400	22-1126	P488-01	D6-103	PTE4S1	GP2-333-103	PT411	4TM-S1	
C31	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C32	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C33	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C34	10000		22-3	BPD-01	MD-103	TM5S1	GP2-333-103	DC-511	5HK-S1	
C35	.047	400	22-1775	489ZX-047		PTE4S47		PT4147	4TM-S47	
C36A	10000		22-2276	BPD-2X01	DD3-103	TM5DS1	811-01	DC-511	5HK-2S1	
B	10000						811-01	DC-511		

CONTROLS

ITEM No.	RATING RESISTANCE	RATING WATTS	REPLACEMENT DATA: ZENITH PART No.	IRC PART No.	CLAROSTAT PART No.	CENTRALAB PART No.	MALLORY PART No.	INSTALLATION NOTES
R1A	1Meg	½	63-2113	Q11-137	AG-61-S	AB-69	U-54	Volume
B	Shaft		Not Req.	Not Req.	KSS-3	AK-4	Not Req.	Attach to R1A
C	Switch		Not Req.	76-1	SWB	KB-1	US-26	Attach to R1A

CHASSIS—TOP VIEW



PROPERTY OF
L. F. MANUFACTURING
3801 CRAPEMYRTLE ST
FT. COLLINS, COLORADO

PARTS LIST AND DESCRIPTIONS (Continued)

RESISTORS

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R2	2.2Meg	1/2	63-1926	BTS-2.2Meg	
R3	220Ω	1/2	63-1758	BTS-220	
R4	220Ω	1/2	63-1758	BTS-220	
R5	220Ω	1/2	63-1758		
R6	100Ω	1/2	63-1744		
R7	2200Ω	1/2	63-1800	BTS-2200	
R8	10KΩ	1/2	63-1828	BTS-10K	
R9	220Ω	1/2	63-1758	BTS-220	
R10	2200Ω	1/2	63-1800	BTS-2200	
R11	4.7Meg	1/2	63-1940	BTS-4.7Meg	
R12	2.2Meg	1/2	63-1926	BTS-2.2Meg	
R13	4.7Meg	1/2	63-1940	BTS-4.7Meg	
R14	220Ω	1/2	63-1758	BTS-220	
R15	100Ω	1/2	63-1744	BTS-100	
R16	220Ω	1/2	63-1758	BTS-220	
R17	47KΩ	1/2	63-1856	BTS-47K	
R18	1Meg	1/2	63-1912	BTS-1Meg	

ITEM No.	RATING		REPLACEMENT DATA		NOTES
	OHMS	WATT	ZENITH PART No.	IRC PART No.	
R19	100KΩ	1/2	63-1870	BTS-100K	
R20	15KΩ	1/2	63-1835	BTS-15K	
R21	150KΩ	1/2	63-1876	BTS-150K	
R22	150KΩ	1/2	63-1876	BTS-150K	
R23	22KΩ	1/2	63-1842	BTS-22K	
R24	4.7Meg	1/2	63-1940	BTS-4.7Meg	
R25	470KΩ	1/2	63-1898	BTS-470K	
R26	1500Ω	1/2	63-1793	BTS-1500	
R27	2200Ω	1/2	63-1800	BTS-2200	
R28	470KΩ	1/2	63-1898	BTS-470K	
R29	150Ω	1/2	63-686	BTS-150	
R30	22Ω	1	63-1450		
R31	39Ω	1	63-2424		
R32	330Ω	1	63-2286	BTA-330	
R33	680Ω	2	63-3153	BTB-680	
R34	1Ω	1/2	63-1223		
R35	470KΩ	1/2	63-1898	BTS-470K	

TRANSFORMER (AUDIO OUTPUT)

ITEM No.	RATING				REPLACEMENT DATA					NOTES
	IMPEDANCE		DC RES.		ZENITH PART No.	STANCOR PART No.	MERIT PART No.	CHICAGO PART No.	TRIAD PART No.	
	PRI.	SEC.	PRI.	SEC.						
T1	2.8KΩ	3.2Ω	300Ω	.53Ω	206-667	A-3876	A-2928	RO-301	S-1X	

SPEAKER

ITEM No.	RATINGS			REPLACEMENT DATA			NOTES
	SIZE	FIELD	V. C. IMP.	ZENITH PART No.	JENSEN PART No.	QUAM PART No.	
SP1	4"	PM	3.2Ω	49-667	ST-113 Mod P4-X	4A07	

COILS (RF-IF)

ITEM No.	USE	DC RES.		REPLACEMENT DATA				NOTES
		PRI.	SEC.	ZENITH PART No.	MEISSNER PART No.	MERIT PART No.	MILLER PART No.	
L1	FM Ant. Coil	0Ω		20-355				
L2	FM RF Coil	0Ω	0Ω	S-13871				
L3	FM Osc. Coil	0Ω	0Ω	S-15733				
L4	AM Loop Ant.	1.4Ω		S-18446				Includes bracket
L5	AM Osc. Coil	6.5Ω		S-15694			71-Osc. *	Tapped ⓐ .8Ω & 2.6Ω
L6	1st FM IF	.5Ω	.5Ω	95-1328	16-3471 ††	FM-254 ‡	1463 ‡	
L7	1st Am IF	5Ω	17Ω	95-1250	16-6666	BC-368	1312-C1	Pri. tapped
L8	2nd FM IF	.5Ω	.5Ω	95-1150	16-3487 †	FM-251 ■	1451 ■	
L9	2nd AM IF	24Ω	24Ω	95-1102	16-6770 †	BC-355 †	12-C6 †	
L10	3rd FM IF	.8Ω		S-14509	16-3487 ▲	FM-254 ▲	1463▲	
L11	FM Discrim.	.4Ω	.4Ω	95-1153		FM-250●	1452 ●	

* Drill mounting hole.
† Remove center spade bolt mounting support and real adaptor plate.
■ Remove center spade bolt mounting support,
▲ Detune unused winding and disconnect C21.
● Add diode filter capacitor externally
†† Drill mounting holes and remove center spade bolt mounting support.
‡ Drill mounting holes, use adaptor plate, and remove center spade bolt mounting support.

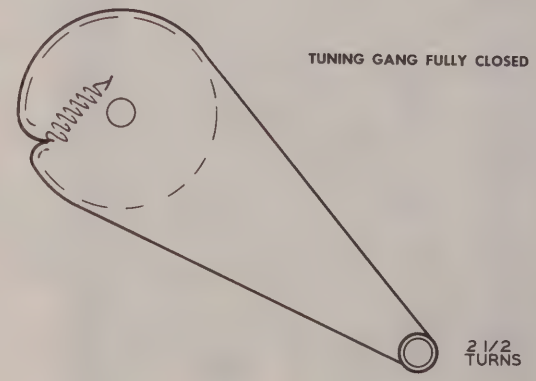
PARTS LIST & DESCRIPTION (continued)

SELENIUM RECTIFIER

ITEM No.	RATING	REPLACEMENT DATA				
	CURRENT	ZENITH PART No.	SELETRON PART No.	FEDERAL PART No.	MALLORY PART No.	SARKES TARZIAN PART No.
M1	.074A	212-13	5M1	1101A	6S100A	100

MISCELLANEOUS

ITEM No.	PART NAME	ZENITH PART No.	NOTES
M2	Tuning cap	22-2449	2 gang (30-452MMF, 29-190MMF)
M3	Switch, band	85-481	
	Dial glass	192-117	
	Cabinet	14-1232	Plastic
	Knob	46-1164	Volume and tuning (2 Used)
	Knob	46-1165	Band switch
	Cabinet back	S-19524	Includes cord with two prong plug and loop antenna



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ZENITH
MODELS S-14053, S-14054, S-14056, S-14057

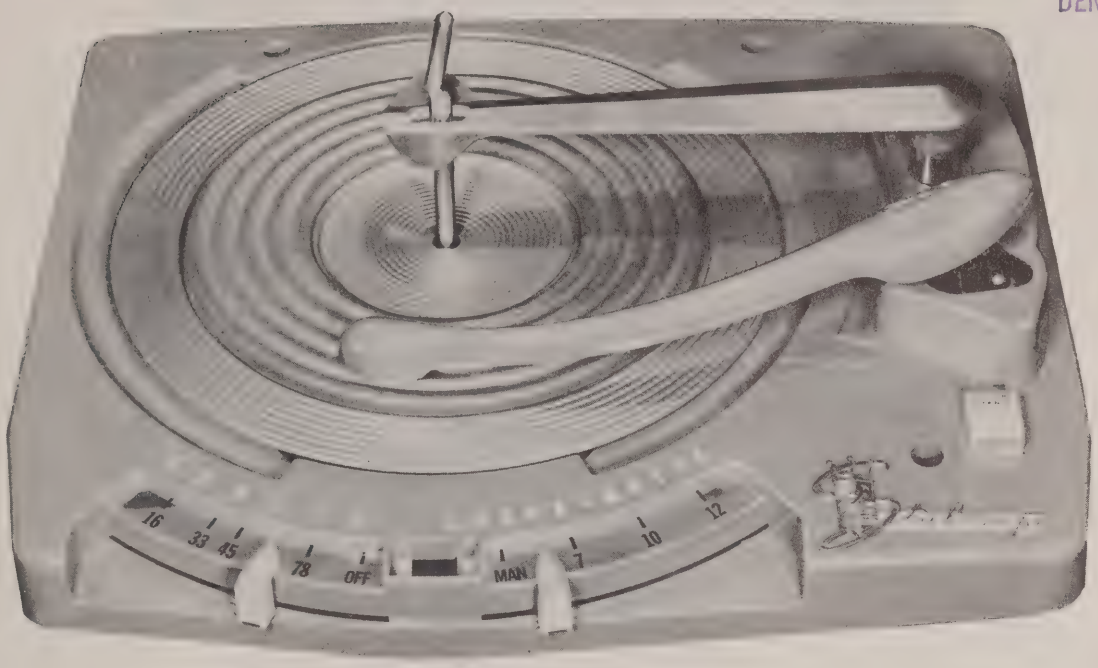

Figure 1

GENERAL INFORMATION

The Zenith Models S-14053, S-14054, S-14056 and S-14057 Record Changers are designed to play standard 78, 45, 33 1/3 and 16 2/3 RPM records of standard commercial dimensions.

Features of these changers include playing and automatically changing as many as ten - 12" or ten - 10" records. Ten inch and twelve inch records of the same type cannot be intermixed.

A full stack of 7" 33 1/3 RPM, or a full stack of 7" 45 RPM records (with adaptor inserted in the records) can also be played on these changers. These changers do not shut off after the last record, however, all that is required to turn the changer off is to move the speed change lever (39) to the "Off" position.

Connect Models S-14053 and S-14054 only to an outlet supplying 117 volt 60 cycle AC unless specified otherwise.

Power consumption is 20 watts.

Manufactured by:

Zenith Radio Corporation
6001 Dickens Avenue
Chicago 39, Illinois

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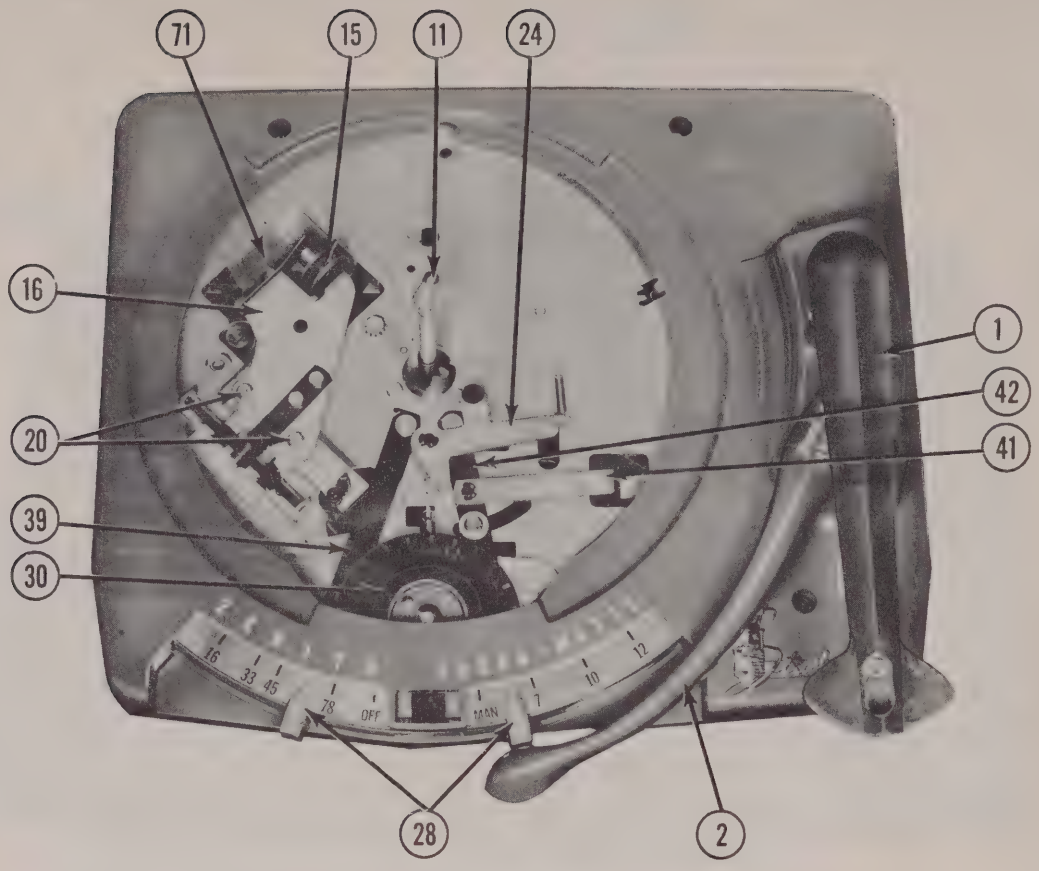

Figure 2

DESCRIPTION OF MODELS

With few minor exceptions these four changers are alike. The S-14054 is the basic record changer. S-14053 is practically identical to S-14054 except that it has added parts for the stroboscope feature. The S-14057 is very similar to S-14054 except that it is the export version, it has a 50/60 cycle motor and minor electrical changes. The S-14056 is similar to the S-14053 except that it is the export version, it has a 50/60 cycle motor and minor electrical changes.

The S-14053 deluxe domestic changer as well as the S-14056, a deluxe export changer have an added feature incorporated in their mechanism in that they have a stroboscope built in, this enables the user to adjust the record speed to a precise point.

PREPARING FOR OPERATION

Shipping Bolts-

Before placing the changer in operation, the machine must be floated freely on the mounting springs. During shipment, the changer is secured to the changer base pan by means of two or three mounting bolts depending on the model. To float the changer, take a wide-blade screw driver and turn down these bolts until they are flush with the record changer base plate.

The motor and motor mounting plate are also bolted to the changer base plate. This prevents the motor drive shaft from contacting the rubber surface of the drive wheel assembly (71), and avoids the possibility of damaging the drive wheel assembly during shipment. Before the changer can be operated, the motor mounting screw (33) must be removed.

LEVELING THE RECORD CHANGER

It is essential to have the record changer absolutely level. Use a torpedo or similar type level on the record changer base plate. Use adequate shims to level the record changer pan or the combination cabinet to achieve perfect level.

OPERATION

Loading-

1. Pull straight up on the record pressure arm until the record pressure arm clears the spindle. Swing the record pressure arm towards the front of the changer until pin in pressure arm shaft (1) drops into locating slot on record pressure arm housing.

2. Changer will automatically play ten 12" either standard or Long Play, ten 10" either standard or Long Play or ten 7" Long Play or Fine Groove records.

NOTE: Standard, Fine Groove and Long Play records cannot be played in the same stack of records. Speed change lever (39) must be re-set for each type of record.

3. Place records on spindle and lower them to offset shelf. Hold records level and replace record pressure arm over spindle.

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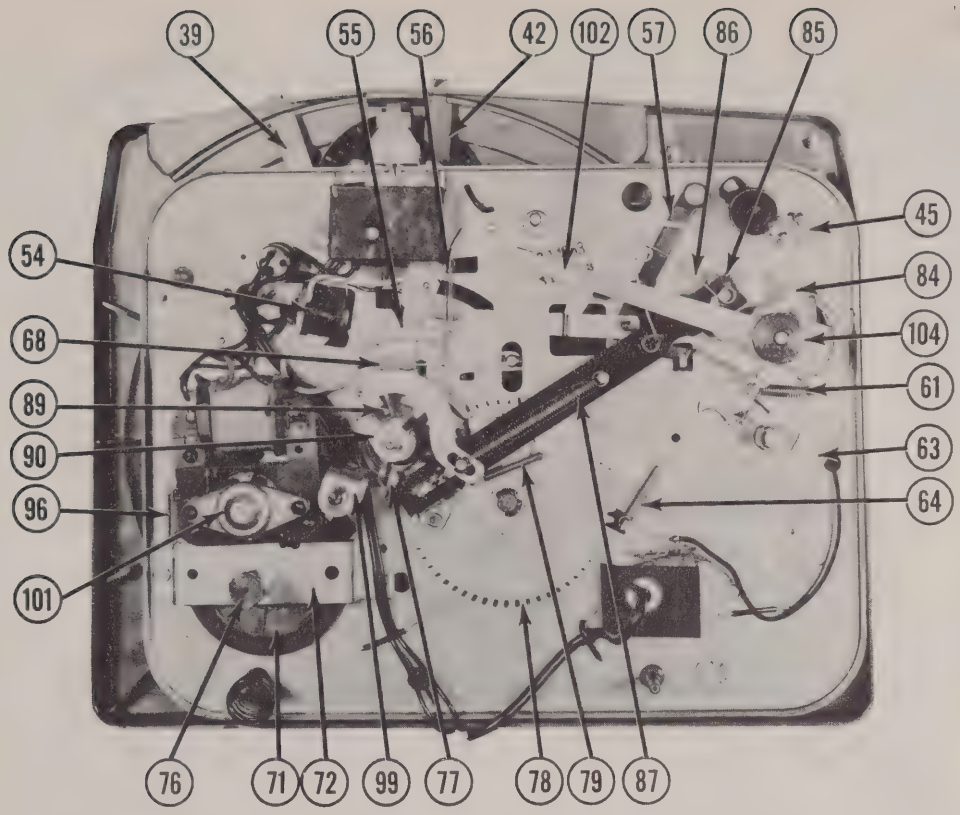

Figure 3

To Play Standard 78 RPM Records-

1. Motor speed control lever (39) must be set to "78" position. This turns the motor switch (53) on, causing the turntable to rotate, and sets the record changer for proper speed.

2. Move the set-up lever (42) to 7", 10" or 12" position, depending on the size records to be played.

3. Depress the record change button (46). The changer will now play the entire stack of records automatically and will continue to play the last record until the speed change lever (39) is moved to the "Off" position.

To Play 33 1/3 RPM Records-

1. Move speed control lever (39) to the "33" position.

2. Move the set-up lever (42) to 7", 10" or 12" position, depending on size records to be played.

3. Depress the record change button (46).

To Play 45 RPM Records-

1. Move speed control lever (39) to the "45" position.

2. Move the set-up lever (42) to 7" position.

NOTE: It is essential that a record adaptor be inserted into each 45 RPM record to reduce the spindle hole to conventional size.

3. Depress the record change button (46).

Rejecting a Record-

A record may be rejected at any time, while it is being played, by depressing the record change button (46).

To Stop The Changer-

To stop the changer, move the speed control lever (39) to the "Off" position.

NOTE: Do not stop the changer during a change cycle

Unloading-

Lift the record pressure arm (1) and swing it to the front until the pin in the shaft drops into the locating groove on record pressure arm shaft housing. Lift stack of records straight up and off spindle.

Manual Operation-

To play single records or home recordings, lift up the record pressure arm and turn it toward the front of the changer. Place record on spindle and lower to the spindle shelf. Gently push record towards record pressure arm shaft and lower to turntable. Move speed change lever (39) to proper speed for type of record being played and move set-up lever (42) to "Manual" position. Pick up tone arm and gently place the needle on the lead-in groove of the record.

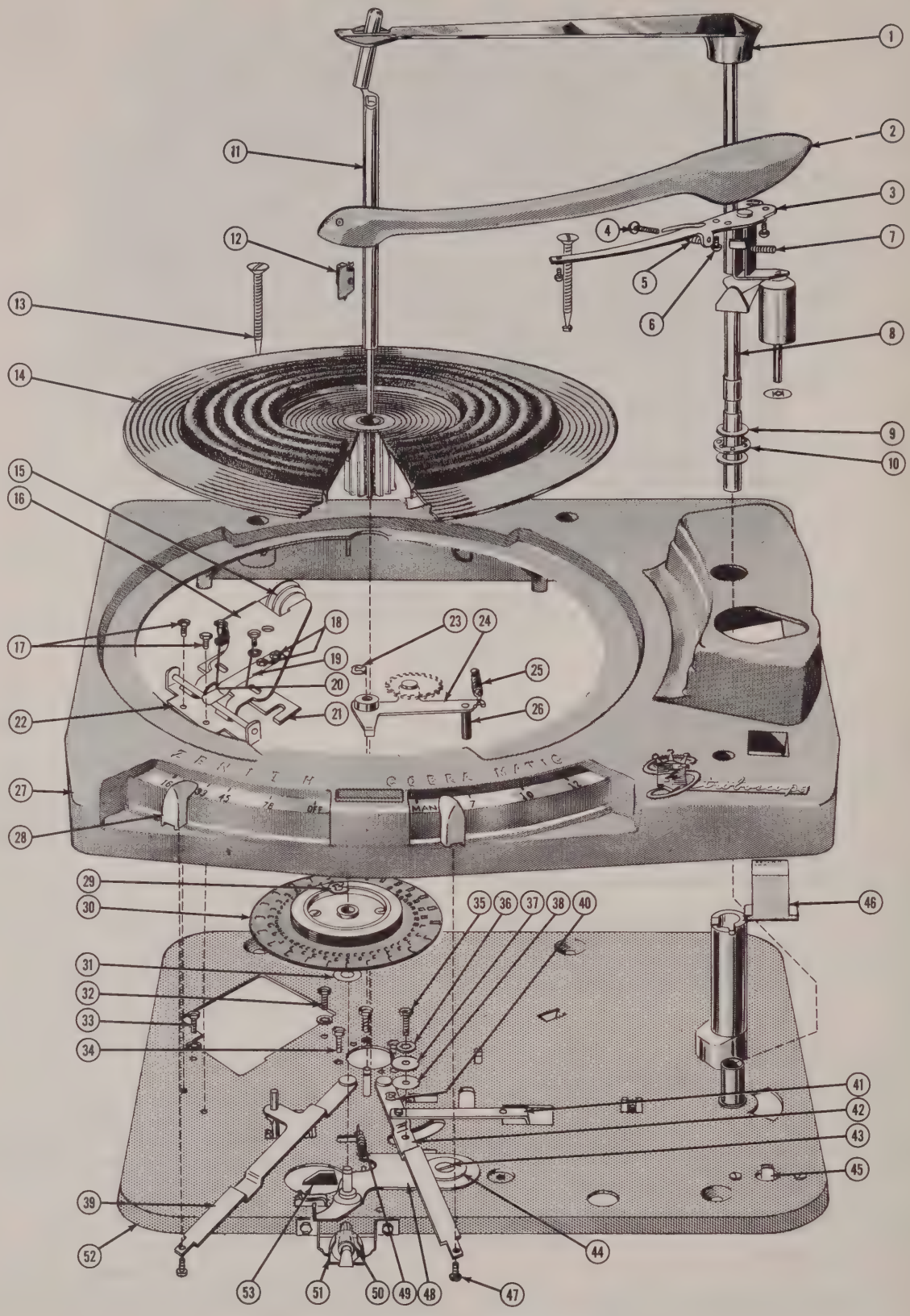

Figure 4A. Exploded View Of Parts Above Baseplate.

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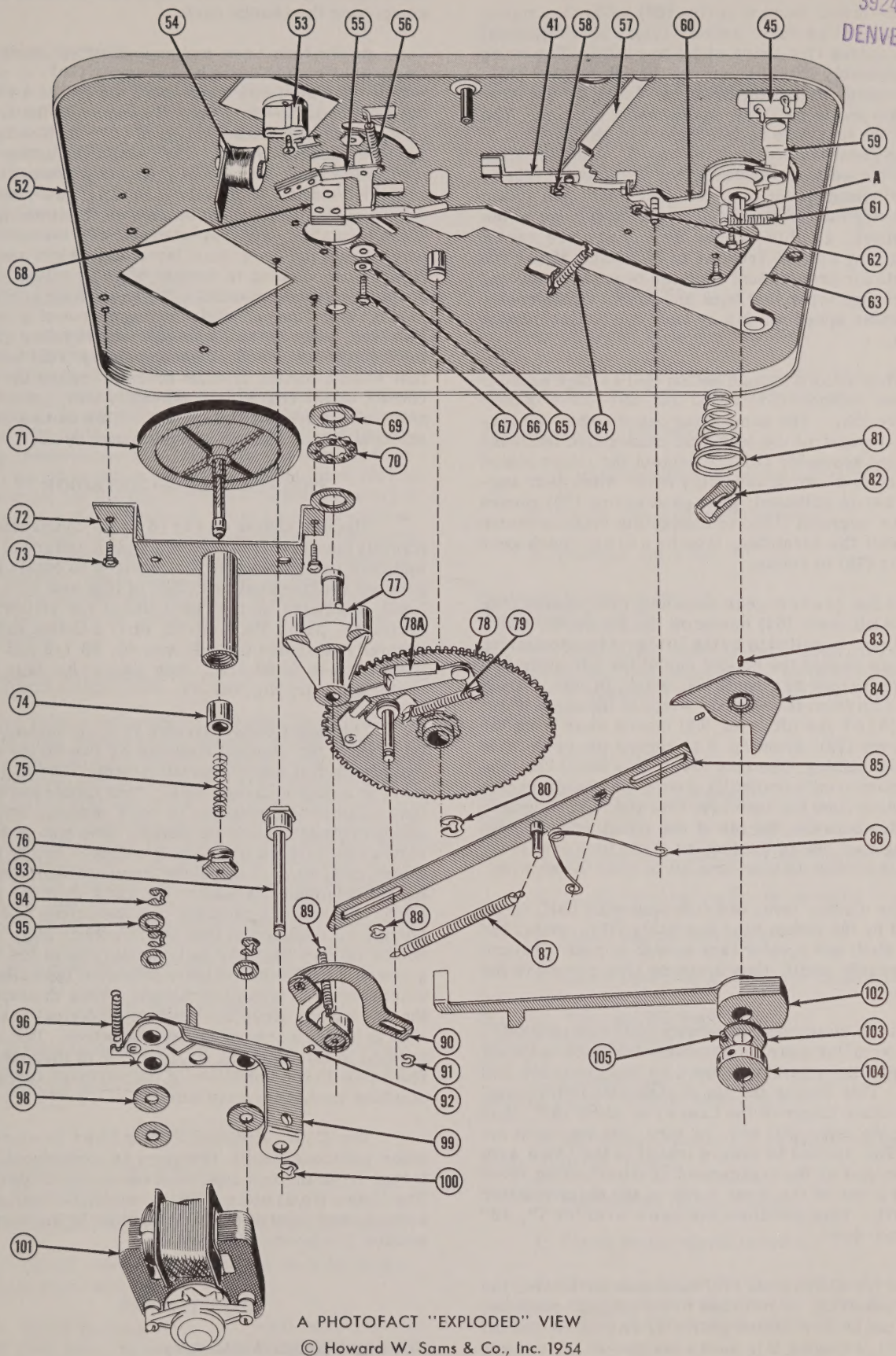

Figure 4B. Exploded View Of Parts Below Baseplate.

CHANGE CYCLE

The motor tension spring (96) holds the motor shaft against the drive wheel (71). This frictional contact causes the drive wheel to rotate. The drive wheel assembly (71) then drives the idler wheel (15). The underside of the turntable is resting on the idler wheel (15) and is driven in this same manner. The speed of the turntable is determined by the position of the idler wheel (15) on the drive wheel. When the idler wheel is moved to the center of the drive wheel (71) by the speed change lever (39), the idler wheel will rotate more slowly than when moved to the outer edge of the drive wheel. In this manner the turntable can be driven at any speed from 10 to 85 RPM. Minor adjustments for proper tonal pitch can be made by moving speed change lever (39) back and forth to compensate for turntable speed which may vary due to line voltage changes.

When record change button (46) is depressed it energizes solenoid (54) which then attracts trip pawl assembly (55). The same thing occurs when the forward movement of the tone arm causes friction lever and weight assembly (102) to contact the silver plated contact on trip switch assembly (68). When gear segment (78A) is released, gear pawl spring (79) causes the gear segment (78A) to engage the rotating pinion gear under the turntable, thus causing clutch gear assembly (78) to rotate.

As the clutch gear assembly (78) rotates, the tone arm lift lever (63) moves off the pin on the clutch gear (78) and is pulled in by the lift lever tension spring (64). This causes the hooked end of the lift lever (63) to engage the tone arm shaft (8), which, in turn, raises the tone arm from the record. Also, at the same time, Finger (A) of the lift lever (63) moves away from the brake lever (59), allowing it to engage the tone arm lever and bushing assembly (84). This keeps the tone arm from moving erratically during the change cycle. At the same time the tone arm link and stud assembly (85) slides outward, the pin of the actuating lever (60) moves against one of the fingers of the tone arm lever (84), thus moving the tone arm out to clear the records.

The ejector lever and link assembly (90), being actuated by the clutch gear assembly (78), rotates the spindle shaft and ejector cam enough to push a record off the spindle shelf, thus dropping the record to the turntable.

As the clutch gear assembly continues to rotate, the tone arm link and stud assembly (85), due to spring (64), pulls the actuating lever and pin assembly (60) inward. This causes the pin of assembly (60) to contact the other finger of the tone arm lever (84), thus pivoting the lever (84) and, in turn, the tone arm inward. The amount of inward travel of the tone arm is determined by the engagement of the actuating lever (60) with one of the three steps on the discriminator lever (57). This positions the tone arm for 7", 10" or 12" set-down.

As the clutch gear (78) continues to rotate, the spindle assembly is returned to its original position, and the pin on the clutch gear (78) engages the lift lever (63), swinging it in such a manner so as to lower the tone arm to the record. Simultaneously, the finger (A) on the lift lever pushes against the brake lever (59) and releases the tone arm. The gear segment (78A) now engages the trip pawl (55), pushing it back so as not to engage the turntable pinion. The open section of the clutch gear (78) now faces the turntable pinion, completing the change cycle.

As the tone arm moves across the record, the friction lever and weight assembly (102) is carried with it. As the tone arm nears the end of a record, the friction lever is pushed away from the tripping point by the oscillating action of the oscillating gear and lever assembly (24). The oscillating action of the oscillating lever assembly (24) is produced by the eccentric motion of the oscillating gear, which is driven by the pinion gear located on the lower portion of the turntable. This repeated action of the oscillating lever keeps the friction lever and weight assembly (102) from coming in contact with the silver contact on the trip switch assembly (68) as the tone arm moves slowly toward the eccentric cycling groove of a record. However, when the tone arm enters the cycling groove, the friction lever and weight assembly (102) is moved fast enough for the friction lever to engage the silver contact on the trip switch assembly (68), grounding it and making a complete circuit. This actuates the solenoid (54) and starts a new change cycle.

THE NEW COBRA CARTRIDGE

The new Cobra cartridge is constructed differently than previous red, red/green and green Cobra Radionic cartridges. If it is desired to obtain an all-purpose replacement cartridge of this new type with a 2 mil. diameter stylus, then obtain the yellow Cobra cartridge, part No. 142-72, or if a Cobra cartridge specially designed for LP type 45, 33 1/3 and 16 2/3 RPM records is desired, then obtain the blue 1 mil. cartridge, part No. 142-71.

This new Cobra cartridge is of the ceramic type. Internally, the element consists of two strips of ceramic material soft soldered on either side of a brass strip in a sandwich-like unit. This construction adds the individual voltages of each ceramic unit, thus giving twice the electrical output. One end of this ceramic sandwich is inserted in a rubber cap at the top of the cartridge. This is the primary mounting point for this element. A rubber cap fits over the bottom of this ceramic cartridge, and the needle and bridle portion is fastened to this lower rubber cap. As the needle follows the lateral undulations of the record grooves it bends the ceramic sandwich laterally, thus disrupting its crystal structure. This disruption of the crystalline structure creates electrical energy by what is known as the piezoelectric effect. The voltage created in this ceramic sandwich is then taken and fed back to the amplifier of the receiver through the shielded lead in the tone arm.

The Cobra Radionic Pickup that is used with some previous Zenith changers is considerably different from the new type Cobra ceramic cartridge. The Cobra Radionic Pickup, instead of generating audio power, controls power supplied by the oscillator section of a phono pre-amp.

ADJUSTMENTS

Tone Arm Height Adjustment-

The tone arm should be adjusted so that it will clear a full stack of 12 unwarped records on the turntable, and, at the same time, clear the underneath

side of a record resting on the spindle step. This adjustment is made by regulating height adjustment screw (7).

Set Down Adjustment-

When adjusting the tone arm for proper set-down on the edge of a record, move set-up change lever (42) to 7" position, place a 7" record on the turntable, turn the changer through cycle by rotating the turntable by hand. Watch closely where the needle point of the Cobra cartridge lands on the record and adjust tone arm set-down adjustment screw (4) until proper landing position is obtained.

Speed Indicator Adjustment-
(Models S-14054 & S-14057)

It is possible that the speed of the record changer may not conform to the speed stop on the escutcheon. Proper adjustments can be made in the following manner. Put a stroboscopic disc on the turntable, adjust speed change lever (39) until the turntable is turning at exactly 78 RPM. Stop the changer by pulling the AC plug, remove the turntable, loosen the two adjusting screws (20) and move speed change lever (39) so that the point on the control knob indexes exactly at the 78 mark on the escutcheon. Then re-tighten adjusting screws (20) and replace the turntable. The turntable should now rotate at exactly 78 RPM, however, as a precaution, again check with the stroboscope disc. On models equipped with the built in stroboscope disc mechanism, it can be used instead of a disc placed on the turntable.

Trip Contact Adjustment-

For proper automatic rejecting, the silver contact on the trip switch assembly (68) should be in proper relation to silver contact on the friction lever (102). The adjustment should be made with the record changer resting on the side nearest the idler wheel and trip assembly. The turntable should be rotated sufficiently to move the oscillating lever (24) and stud to its maximum upward travel. The distance between the silver contact on the friction lever (102) and the silver contact on the trip switch (68) should be 1/16". If the distance is greater or less than 1/16", the support for the silver contact on the trip switch assembly (68) should be bent until this 1/16" gap is attained.

SLAB HEAD SCREWS

To dismantle many components of this changer, a slab head set screw wrench is required. This wrench is available as part No. 68-8.

TROUBLES

Needle Does Not Track Across
Record Properly-

1. Clean foreign material from around needle.

2. Check needle to see if tip is bent or broken. Replace needle cartridge.

3. Hinge bearing binds. Check lateral movement of tone arm. It must move freely without binding.

4. Excessive vibration while playing an LP record. Any vibration caused by unsteady mounting, floor vibration or the passing of a heavy vehicle may cause the tone arm to glide across the record grooves.

Mechanism Starts Slowly And
Motor Gets Hot-

1. Check line voltage and frequency.

2. Check lubrication.

3. Motor windings damaged.

4. Room temperature abnormally low.

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Motor Fails To Run-

1. Open windings.

2. Damaged or frozen bearings.

3. Lower rear support bracket bent. Remove and straighten bracket - re-center armature.

Tone Arm Falls Off Record-

1. Check tone arm set-down adjustment.

2. Check tone arm pivot bracket.

3. Changer not level.

Squeaks Or Noises During
Playing Of Records-

1. Friction between the records on the turntable and the spindle will occasionally cause squeaks. A thin coat of wax applied to the spindle will remedy this condition.

2. Check lubrication.

Record Is Not Heard Although
Changer Operates-

1. See that the receiver is set for Phono.

2. Check receiver audio by listening to radio.

3. Check needle cartridge.

4. Check tone arm housing for broken leads.

Rumble, Wow and Microphonics
During Reproduction-

1. Changer not "floated" properly. Remove packing strip. Loosen mounting bolts.

2. Motor leads pulled too tight preventing motor from "floating" freely.

3. Impression on idler wheel.

4. Check motor shock mounts.

5. Check the motor drive shaft and be certain the plane of the shaft's diameter is parallel to the rubber surface of drive wheel assembly (71).

Needle Fails To Clear Maximum Load
Of Records On The Turntable-

1. Check tone arm height adjustment.

Tone Arm Sets Down Too Far In Or Out On Record-

1. Check tone arm set-down adjustment.

Tone Arm Set-Down Varies-

1. Tone arm pivots loose.

Changer Continues To Cycle-

1. Check the trip switch adjustment.

2. Trip pawl sticks.

Changer Will Not Cycle Upon Completion Of Record-

1. Check to see if the record has an eccentric cycling groove.

2. Check trip mechanism.

Chatter Of Trip Pawl Assembly-

1. Remove mounting bolt which fastens trip pawl assembly (67) to the shoulder stud. Then load shoulder stud with Sta-Put Grease and replace the trip pawl assembly.

Electrical Noise When Tone Arm Is Moved-

1. Stud on oscillating lever and stud assembly (24) should be covered with vinylite tubing to prevent contact with friction lever and weight assembly (102).

2. Friction lever (102) at its most outward swing may contact wire guide stud on changer base plate. Cover this stud with vinylite tubing.

Friction Lever (102) Fails To Move With Tone Arm-

1. Check felt washer (103) for proper friction surface. If worn, replace.

LUBRICATION

This changer has been lubricated at time of manufacture and should require no further attention; however, if necessary, due to unusual use or high operating temperatures, the changer should be lubricated as follows:

All shoulder rivets which hold moving parts, all stud shoulder mounting points on which moving parts operate, and all "C" washers should be lubricated with a few drops of fine instrument oil.

All other sliding surfaces and points of contact should be lubricated with a good grease.

CAUTION: Do not, under any circumstances, allow oil or grease to come in contact with the motor drive shaft rubber surfaces of the drive wheel (71) and idler wheel (15), or the underneath surface of the turntable. If oil or grease comes in contact with these surfaces, clean with a good cleaning fluid.

PARTS LIST

Ref. No.	Part No.	Description	Ref. No.	Part No.	Description	Ref. No.	Part No.	Description
1	S-19943	Pressure Arm & Shaft Assembly	32	114-345	10-32 x 3/8 Hex Hd. Mach. Screw (Motor Mounting)	68	S-16933	Trip Switch Assembly
2	S-19918	Cobra Tone Arm Assembly, Complete Less Cartridge	33	114-357	10-32 x 3/8 Hex Hd. Slotted Mach. Screw - Red Finish (1 used on Motor Assembly in Shipping)	69	93-1070	Bearing Washer
3	S-16986	Hinge Plate and Bracket				70	6-59	Spindle Bearing (Bearings & Race)
4	69-261	6-32 x 11/16 Phil. Rd. Hd. Mach. Screw	34	114-348	8-32 x 5/16 Hex Hd. Self Tap Screw	71	S-16922	Drive Wheel Assembly
5	80-609	Landing Adjustment Spring				72	S-16923	Drive Wheel Bracket & Bearing Assembly
6	112-619	2-32 x 5/16 Rd. Hd. Self Tap Screw	35	113-9	8-32 x 1/4 Hex Hd. Mach. Screw	73	114-217	8 x 1/4 Hex Hd. Self Tap Screw
7	69-282	8-32 x 5/8 Phil. Rd. Hd. Mach. Screw (Tone Arm Height Adjustment)	36	93-132	.038 x 11/64 x 7/16 Steel Washer	74	6-61	Compression Spring Bearing
			37	93-968	Steel Washer	75	80-816	Compression Spring
			38	93-1093	Spring Washer	76	112-804	Compression Spring Retaining Screw
8		Tone Arm Shaft Assembly	39	S-16901	Speed Change Lever and Stud Assembly	77	S-16913	Gear Housing & Sleeve Assembly
9	6-64	Tone Arm Bearing				78	S-16912	Clutch Gear Assembly
10	93-1071	Bearing Washer (2 used)	40	188-149	Retaining Ring	78A	60-16	Gear Segment Pawl
11	S-19926	Spindle Assembly (Only Stocked Complete-Except for Cap. 15-81)	41	118-58	Set Up Link	79	80-698	Gear Segment Pawl Spring
			42	S-19915	Set Up Change Lever & Stud Assem.	80	188-147	Retaining Ring
12	142-72	Ceramic Pickup Cartridge (Yellow 2 Mil for 33 1/3, 45, 78 RPM)	43	71-84	4-32 x 3/8 Flat Hd. Mach. Screw	81		Changer Mounting Spring
			44	94-816	Pivot Bushing	82		Changer Retaining Clip
	142-71	Ceramic Pickup Cartridge (Blue 1 Mil for 16 2/3, 33 1/3, 45 RPM)	45	85-483	Record Change Switch	83	73-99	8-32 x 1/4 Slab Hd. Set Screw
			46	46-1156	Record Change Button	84	S-16908	Tone Arm Lever & Bushing Assem.
13		Changer Mounting Bolt	47	112-806	4 x 3/8 Binder Hd. Self Tap Screw	85	S-17391	Tone Arm Link & Stud Assembly
14	S-19920	Turntable Assembly	48	S-19930	Strobe Wheel Bracket Assembly	86	80-813	Tone Arm Toggle Spring
	196-221	Turntable Pad	49	80-948	Strobe Bracket Spring	87	80-871	Tone Arm Link Spring
15	S-16921	Idler Wheel Assembly	50	100-160	Neon Lamp	88	188-149	Retaining Ring
16	S-18114	Idler Wheel Bracket & Shaft Assembly	51	12-1989	Neon Bulb Bracket	89	80-814	Ejector Lever Spring
			52		Baseplate	90	S-18117	Ejector Lever Link & Screw
17	114-217	8 x 1/4 Hex Hd. Self Tap Screw	53	85-527	On-Off Switch	91	188-149	Retaining Ring
18	114-217	8 x 1/4 Hex Hd. Self Tap Screw	54	S-13913	Magnet Coil Assembly	92	73-112	8-32 x 1/2 Slab Hd. Set Screw
19	80-874	Idler Bracket Retaining Spring	55	S-15505	Trip Pawl Assembly	93	97-391	Motor Mtg. Stud
20	114-217	8 x 1/4 Hex Hd. Self Tap Screw	56	80-582	Trip Pawl Spring	94	188-149	Retaining Ring
21	57-1920	Adjustment Plate	57	S-16900	Discriminator Lever & Stud Assembly	95	93-903	Steel Washer
22	S-19913	Guide Bracket & Shaft Assembly				96	80-815	Motor Tension Spring
23	188-149	Retaining Ring	58	188-149	Retaining Ring	97	125-61	Rubber Grommet
24	S-16918	Oscillating Gear & Lever Assembly	59	S-17166	Brake Lever Assembly	98	93-900	Fibre Washer
25	80-582	Trip Lever Spring	60	S-16903	Tone Arm Lever & Stud Assembly	99	S-16924	Motor Mtg. Plate & Stud Assembly
26		Vinylite Sleeve	61	80-809	Brake Spring	100	188-148	Retaining Ring
27	43-226	Plastic Housing	62	188-149	Retaining Ring	101	141-129	Motor
28	46-1093	Control Knob	63	117-145	Tone Arm Lift Lever		141-131	Motor 50-60 Cycle Export
29	188-164	Retaining Ring	64	80-613	Tone Arm Lift Lever Spring	102	S-16910	Friction Lever & Weight Assem.
30	S-19928	Strobe Disc Assembly-60 cycle	65	93-1084	Steel Washer	103	93-1055	Felt Washer
	S-19929	Strobe Disc Assembly-50 cycle	66		Lockwasher	104	94-723	Friction Lever Retaining Bushing
31	93-678	Fish Paper Washer for Strobe	67	113-9	8-32 x 1/4 Hex Hd. Mach. Screw	105	73-112	8-32 x 1/2 Slab Hd. Set Screw